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PACT OF ISLANDS

ENERGY ACTION PLAN

LATSIA MUNICIPALITY CYPRUS

22 November 2011

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_2 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.

Latsia is district of Nicosia is an independent municipality and from 23 February 1986. It is 7 km from Nicosia, is located at an altitude of 190 meters and covers an area of 16.28 sq km. The population of the municipality amounts to 13,000 inhabitants.

The year 2009 was designated as the reference year / recording of energy consumption and CO2 emissions in the City. According to actual consumption data collected by the Electricity Authority of Cyprus, the oil companies, etc. Statistical Service of Cyprus total energy consumption in Latsia 2009 was 357.849 MWh. The largest consumer of energy in the municipality is the transport 190.525 MWh, then the tertiary sector with 77.276 MWh.

The CO_2 emissions in 2009 attributable to the overall energy consumption in the municipality are 153.557 tons.

For the forecast of CO_2 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 153.557 tons.

The Sustainable Energy Action Plan 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_2 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 Savings in Municipality public buildings	6
Energy savings via informational campaigns	13
Energy savings in transport	5
Energy savings in street lighting	1
Municipality investments in renewable energy	1
Development of green spaces	1

The annual estimated emission reduction for 2020 with the implementation of the above measures is approximately 10,620 tons. Also, it was estimated that the impact on Latsia municipality from the application of the national measures taken to reduce emissions of carbon dioxide will be an additional reduction of approximately 23,205 tons.

Therefore the implementation of the Energy Action Plan and a total reduction of 33,825 tons, annual emissions in 2020 will be limited to 119,732 tones. That is, 24% less than the reference year is 2009.

The budget of the Action Plan for the period 2010 to 2020 amounts to € 743.125. Funding for the implementation of the Energy Action Plan is expected to stem from the following resources:

- Budget of the Municipality
- From the savings that will result in energy reduction measures in buildings, vehicles and street lighting in the municipality.
- From revenues derived from investment of the municipality in Renewable Energy.
- Possible funding from the Fund will be created from the proceeds of Tender greenhouse gas emissions
- Possible funding from other European programs.

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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 set by the EU for 2020, namely a reduction of CO_2 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 Eileen Siar (CnES) – The Outer Hebrides of Scotland. The project is funded by the European Commission, Directorate General for Energy.

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_2 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 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:

Strovolos Municipality	**Idalion Municipality**
Agios Athanasios Municipality	**Latsia Municipality**
Lakatamia Municipality	**Paralimni Municipality**
Aglantzia Municipality	**Geri Municipality**
Larnaca Municipality	**Ergates Community**
Aradippou Municipality	**Psimolofou Community**
Polis Chrysochous Municipality	**Lefkara Municipality**

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

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 Xatzittofis (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. 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 long 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 era and prehistoric settlements.

The main economic activities of the island are tourism, clothing exports and craft items 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 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 km²
Population:	0,8 million
Currency	euro

Source: http://europa.eu

3 Latsia Municipality

3.1 Introduction

Latsia district of Nicosia is an independent municipality and from 23 February 1986. It is 7 km from Nicosia, is located at an altitude of 190 meters and covers an area of 16.28 sq km. The population of the municipality amounts to 13,000 inhabitants. It is divided into three parishes of St. Eleftherios, Saint George and the refugee settlement of Archangel Michael. The city is twinned with Latsia the Kilkis.

The area probably first inhabited by the Frankish peasants who worked in the area feuds. In 1790 the squire area Kioroglou decided to sell to farmers who worked and came here from the village Lythrodontas. Latsia bought the 16 Greek and a Turk who shared the land into equal pieces except the Turk who got the biggest part. These were the first inhabitants of the region and they built the first settlement, the settlement originally came only during the sowing and harvesting. In 1909 his heirs sold the land Turk in Greek and gradually began to settle in the village the first permanent residents. Latsia settled many refugees after the 1974 war, refugees who settled in Latsia came from 120 different villages occupied. In 1973 he had just 1,108 residents to grow by 2008 to 22,000 residents.

[Source: www.latsia.org.cy]

3.2 History

The oldest tracings of civilisation in Latsia are to be found in a small structure and a reservoir, dating back to the Hellenistic age (325-50 BC). Yet, there is no other evidence to support that Latsia was a settlement during that era. We, therefore, must seek its origins back to the middle Ages. Latsia was probably a big feud during the Frankish Period (1192-1489) and the Venetian era (1489-1570); that is what the verbal tradition reports, backed up by maps of the relative periods. In 1571, when the Ottomans took over Cyprus, Latsia became a “ciftlik” (estate, a large parcel of land, cultivated by the locals and owned by a wealthy Turk, called “aga”) and, presumably (according to the verbal tradition) the dense population was wiped out by the conquerors.

In 1790, Kuroghlou, the aga of several areas (Aglanjia), Chrysospiliotissa, Dali, Deftera, Latsia, Pallouriotissa, Psimolophou, Strovolos and Yeri) - and, according to our national poet, Vasilis Michaelides, a personal friend of Archiepiskopos Kyprianos - decided to sell one of his ciftliks to the people who cultivated them, because he was more than content by their work, and also by their “gifts”, which included tarry pine firewood. We, however, must also account for the continuous droughts and scabs, the diminished efficiency of the cultivations and the dishonesty of some slaves, factors which contributed to his decision to sell up a parcel. It appears that Kurouglou decided to couple kindness with selling. The farmers were villagers from Lythrodontas, a large village about 21 Km (13 mi) to the South-West of Nicosia. They had to choose between Latsia and Koupati, an area to the central-eastern part of Nicosia. They chose Latsia, because it was nearer to Lythrodontas but, also, because it was much bigger and more fertile, allowing them to cultivate all sorts of agricultural products.

Thus, sixteen (16) Greek-Cypriots and a Turkish-Cypriot “kadi” (chief-judge), called Kufis, bought Latsia, an area of 11.600 dona (1 donum = 1.337,8 sq. metres or 14,400 sq. ft) for the price of 14 pockets (a pocket was worth 500 “rialia”, the money of that time). Kufis offered one fifth of the price and the village was divided into twenty (20) parcels, four (4) for Kufis and one (1) for each Greek-Cypriot. Kufis, owning considerable property in Lythrodontas, helped them to ensure their safety in Latsia and also helped them when Kuroghlou’s descendants set up a claim for the ciftlik. These seventeen persons revitalised the

settlement, a hamlet in fact, by coming in the autumn (October and November) to sow wheat and plant olive trees and in the summer (May to August) to harvest the wheat crop, rip and thresh, and collect the olives. However, they chose not to reside in Latsia, not only because they thought Lythrodontas was a better and more secure place (the so-called "small Paris"), but also because there were no educational or structural means in the village. Only a handful of people resided in Latsia, in order to cultivate the corn, water the olive trees and ensure that everything was all right. Kufis gave away some part of the land to his brother, who - in turn - sold it to six (6) Greek-Cypriots for the price of a pocket for 100 dona. These six men resided permanently in Latsia, in order to carry out the farming and fixing stuff. On 30 April 1909 (two years after Kufis' death), the four heirs sold their territorial rights to eight (8) Greek-Cypriots for the price of £350. It is common to find micro-toponyms related to the first buyers.

In the middle of the 19th century, some of the owners began settling in Latsia, not only because the land was more fertile, but also due to the proximity of Latsia to Nicosia - the centre of the island's financial and commercial life - so they could sell their products more easily. However, it was not until 1930 that an Elementary school was founded. Previously, the children had to attend school either in Lythrodontas or Yeri, a nearby village. Several houses from the late 19th and early 20th century can be found in the old Latsia area. Because the primary income for the people of Lythrodontas came from oil production, they started planting more and more olive trees in Latsia.

After World War II, more and more people from Lythrodontas began migrating to Latsia, along with their extended families, thus the population continued to increase. The Turkish invasion and continuing occupation forced 185.000 - 200.000 Cypriots to become refugees in their own country, necessitating the building of numerous refugee housing estates by the government throughout the island. Three of them were built in Latsia (plus a refugee self-housing estate), increasing the population dramatically. This, in combination with the general trend of people from the centre of Nicosia and villages close to the capital to move to areas in the suburbs of Nicosia, resulted into the population explosion that made Latsia a small town that continues to rapidly grow

[Source: www.latsia.org.cy]

3.3 Nicosia Local Plan

Until 1990 the control of development in Cyprus was based on the Law on regulating Streets and Buildings and relevant regulations (or amendments). This legislation did not provide sufficient opportunities for effective control of urban development nor the means to allow the exercise of spatial planning policy, or indirect interference in the processes of land purchase. The role of the public sector was essentially regulatory and somewhat negative in character, since it was only possible to respond to private sector initiatives. In Cyprus the spatial planning is responsibility of the central government however the role of the local authorities is during the preparation of the Local Plans.

In view of the strong growth of development pressures caused by the natural population growth, urbanization and the development of industry, commerce, tourism and services, the Cyprus State has decided to implement urban planning legislation, to ensure rationalization of physical development. For this purpose, the Law on town and spatial planning of 1972 and subsequent amendments were voted, which became fully operational for the first time on December 1, 1990.

The Nicosia Local Area Plan was prepared in accordance with the relevant provisions of the Law on town and spatial planning and its launching point was the Nicosia Master Plan (Nicosia Master Plan), prepared by the Cyprus Government in collaboration with Nicosia Municipality and the Development Program of the United Nations (UNDP). The Nicosia Local Plan was first published on the 1st December 1990. The first amendment of the Local Area Plan was published on the 4th October 1996, and the Plan was finalized after studying the appeals, which was completed and published in two phases (1999 and 2000). During the study of this amendment, consultations were performed with a Joint Council established according to the provisions of Article 12 (1) of the Town and Country Planning Act.

The Nicosia Local Area Plan specifies general principles upon which development in the area under the Local Area Plan will be promoted, monitored and regulated. It is expected that through the implementation of the provisions of the Plan a balanced urban development and consolidation of the wider area of Nicosia will gradually be reached.

The Local Area Plan includes the areas of the Municipalities of Nicosia, Agios Dometios, Engomi, Strovolos, Aglantzia, Lakatamia and Latsia and the area of the Geri Community Council, as shown in Figure 1 Study Area and Administrative Structure. The Local Area Plan extends over an area of 19,000 hectares and, according to the report of Statistics Census of Population (October 2001) - Population Figures by District, Municipality and Community in October 2001, includes a population of 198.200 people.

[Source: *Department of Town Planning and Housing]*

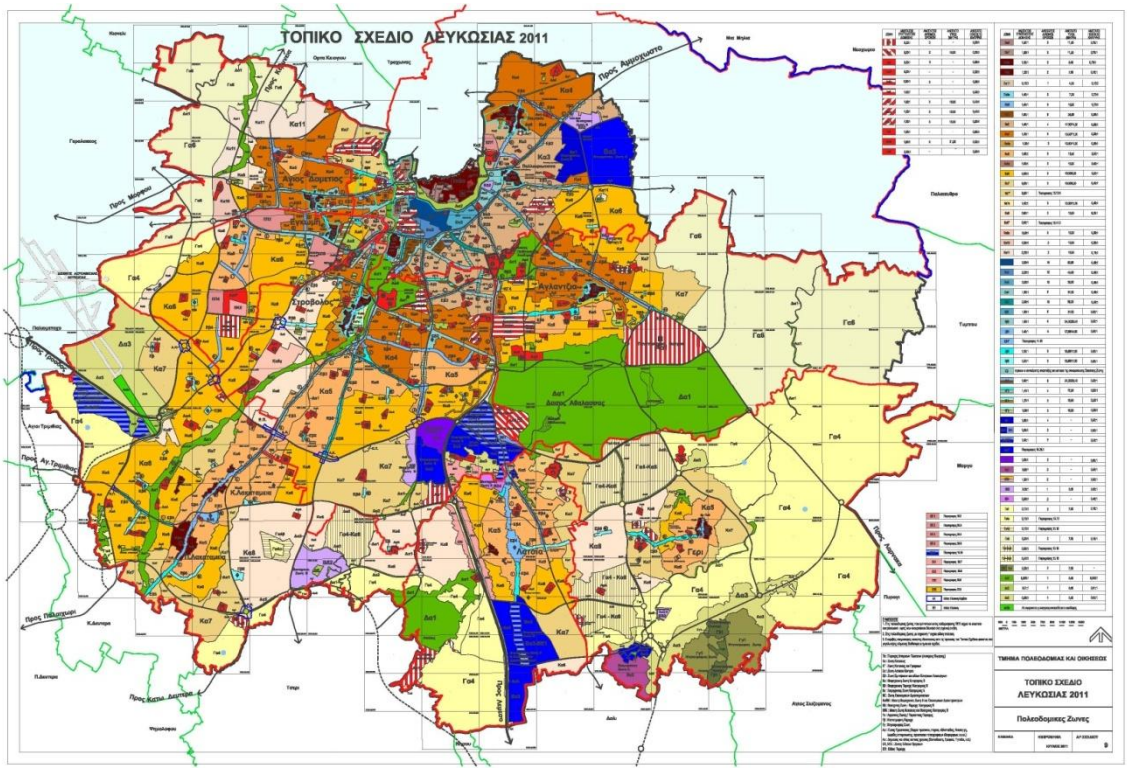


Figure 10 **Nicosia Local Area Plan**

3.4 Main Objectives of the Local Area Plan

The Nicosia Local Area Plan aims to establish and implement an appropriate long-term planning policy framework that will enable the rational development of Nicosia by the year 2012, which is defined as the horizon year of this Local Area Plan.

When considering this amendment to the Nicosia Local Area Plan, key targets set in the original publication of the draft were re-evaluated and it was confirmed that they form the best choice for the gradual reorganization and planning of urban development. These objectives, enriched with contemporary urban design concepts are summarized as follows:

(a) The rational distribution of land uses in order to ensure the best economic and functional organization of the city, with the best possible separation of incompatible uses, to protect the quality of life of the population, and to ensure a balanced variety of compatible uses, wherever this is desirable.

(b) The conservation of natural resources and natural environment of the areas under the Local Area Plan, for the benefit of present and future urban population, according to the principles of sustainable development.

(c) The assurance of the potentials of planning and operational reunification of Nicosia after withdrawal of the buffer zone, and the conservation of the operational perspective of broader Nicosia as a single and undivided city.

(d) The upgrade of the organization and, as a result, the operation of the urban cluster of the broader town of Nicosia as a single whole.

(e) The adoption of feasible solutions in relation to the existing situation and the implementation, within the above framework, of adaptable and flexible policy measures that enable future amendments and adjustments to unforeseen changes, if this becomes necessary by prevailing conditions.

(h) The assurance of a beneficial and efficient use of the 12 land 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, sewerage, etc.).

(i) The gradual upgrade of facilities, quality of life and level of service to the entire urban population.

(j) The safeguarding and promotion of organized and integrated urban development through the application of provision bundles and incentives to encourage adoption of the designated Development Areas.

(k) The assurance of the conditions for upgrading the Development Areas to substantial nodes of concentration of future physical development and, therefore, social and economic activity.

(l) The rationalization of the residential areas such that the functional interrelationship of population distribution of job opportunities and services is achieved.

(m) The creation of appropriate conditions for the realization of residential developments to meet the needs and capabilities of all income groups of population growth areas within the

Local Area Plan, both through public and private sector, and the encouragement of single integrated design of residential developments .

(n) The adoption of measures that will contribute to a gradual, but substantial, resolution of operational or other problems encountered in individual urban areas.

(o) The application of a modern multidimensional traffic policy aimed at balancing the current and future operating needs of the entire city and all income groups of population.

(p) The implementation of policy measures that will contribute to the protection and enhancement of the critical role played by the Urban Center as the operational center of the whole of Nicosia, its wider area, but also the whole of Cyprus.

(q) The balanced distribution of commercial activities and uses at strategic points of the urban fabric and the hierarchy of local commercial cores based on the population they serve.

(r) The safeguarding of data and areas of special or exceptional natural, historical, cultural and architectural interest. In particular, the adoption of a program for protection, conservation, regeneration and rejuvenation of the walled town and other historical core is sought after, such that these areas are upgraded to attractive residential areas, employment areas and areas of cultural activities.

(s) The protection and gradual improvement of the natural environment of the areas included in the Local Area Plan, since this is a crucial parameter for ensuring quality of life and balancing of uses and of ecosystems.

(t) The enhancement of opportunities for recreation and entertainment of the entire urban population, and the optimum use and enrichment of appropriate existing green spaces and the development of new ones for the development of an integrated and hierarchical system of free green spaces.

3.5 General Development Strategy

To achieve these goals various alternative options were assessed. As a result, the following General Development Strategy and individual sub-urban policy provisions have been in effect since 1990. The basic criterion for adopting this strategy, which was evaluated and confirmed in the current amendment of the Plan, is to use resources sparingly in order to ensure their continued use by future generations, as well as to organize and consolidate effective development. The General Development Strategy of the Local Plan is based on the principle of organized and integrated development of 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 the stated policy of discouraging the proliferation of various types of development in areas other than those specified, consistent with the guidelines and philosophy promoted by the European Union concerning the organization of urban areas. The General Development Strategy is the backbone of the Nicosia Local Area Plan upon which the individual policy provisions mentioned in various specialized areas of development are based (e.g. residential and commercial development).

[Source: *Department of Town Planning and Housing*]

Figure 11 Latsia Municipal Building

Figure 12 Latsia Municipal Theatre

Figure 13 Latsia Municipal Library

Figure 14 Municipal Park

Figure 15 Saint Giorgio's church

Figure 16 Sports Installation

Figure 17 Olympic Shooting-range

Figure 18 The Kakkaristra Canyon

Figure 19 Athalassa National Park

Figure 20 A' Elementary School

[Source: http://www.latsia.org.cy]

3.6 Culture bid

Latsia Municipality enables the cultural choices to its citizens. The Public Library operates as a lending from November 1996. Housed in the same room with the other offices of the Municipality at Kranidiotis Avenue 57, 1st Floor, Latsia. To become a member you must complete a special form, which can be found in the Library. For applicants less than 18 years will need to endorse the request one of their parents. The Library has today about 10,000 books covering all interests of the citizens. The books are classified according to the international classification system Melvil Dewey. That is classified into ten broad categories according to their topic. There is even a section of the books from twinning municipality of Kilkis. The Library also has educational video and CD. in the reading room and library functions. Guests can enjoy complimentary copies and there are computers with Internet access and printer for use by members of the Library. Since 2006 works in the library INFOPOINT ie point lifelong education with a computer and printer subsidized by the European Union.

Also there are the band of the municipality with choirs, mandolins, band and children's choirs.

Residents of those on the Art Workshop are the options for pottery, iconography, photography and mosaic.

The Municipality is organizing an International Lachi Puppet and Mime. The festival is addressed in its own unique way, but children and adult audiences. Like last year, this year, the Festival invites us on a fascinating journey, to share all ages the magic of art and culture.

Finally there is the Municipal Multipurpose Center Constantine Ch. Kapodistrias - Sports Center "Sotiris Messios" - Sports Center "Sotiris Messios" for sports activities.

3.7 Environmental policy - Develop green spaces

Latsia have more than 20 parks and more than 6,000 trees have been planted in the past 15 years. These parks were created by the City and are dedicated to national heroes and other important figures. Part of Latsia included in the National Forest Park Athalassa. Latsia is a "green" City and the continuing policy is to encourage residents to plant as many trees as possible. Latsia Municipality also participates actively in the European aluminum recycling program «Life 2000».

Following is the list with the public green areas of the Municipality:

- A’ Elementary School Park

- Apostolou Louca Park
- Dorou Loizou Park
- Theofilou Georgiadi Park
- Macedonias Avenue Park
- Kyprou Chrisanthi
- Melina Mercury Park
- Poulou Neofytou Park
- Pavlou Hisou Park
- 28th Octovriou Street Park
- Gravias Street Park
- Dimitri Stavrou Street Park
- Evagora Palikaridi Street Park
- Ikarou Street Park
- Onisiforou Kleride Street Park
- Profiti Hlia Street Park
- Taki Sofocleous Street Park
- "Deka Anomatoi" Park
- Plateia Irenes Park
- Apostolou Andrea Park
- Apostolou Louca Park
- Archaggelou Michail Park
- Green Space Avtostegasi
- Green Space B' Elementary School
- Green Space C' Elementary School
- Green Space D' Elementary School
- Hunt Green Space
- Monument to the Fallen Heroes and Missing People
- Green Space at Municipality's Warehouse
- Green Space at Agiou Amvrosiou Street
- Green Space at Agiou Eleftheriou Street
- Green Space at Athalassis Street
- Green Space at Andrea Avramidi Street
- Green Space at Karpathou Street

[Source: http://www.latsia.org.cy]

4 Current Energy Situation at Latsia Municipality

4.1 Description of Latsia Municipality buildings

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 the hours and every Wednesday until 18:00.

Table 1 Latsia Municipality building list

A/A	Building/Consumption	Power Consumptions (kWh)	Oil Consumptions (kWh)
1	Town Hall	363.000	74.000
2	Center Constantinos Kapodistriasς	1.500	
3	Music Center	2.608	
4	Art Workshop-Shelter Apostolos Andreas	233	
5	Municipality Warehouse	26.760	
6	Sports Center «Sotiris Messios»	28.093	

Table 2 Town Hall Description

PLACE	AREA m^2	LIGHTING TYPE	QUANTITY
Basement	1661	FLORESCENCE	214
Offices	1860	Fixtures/Florescence	172
		Round Fixtures	229
		Lobby Lighting	16
		Spot lights	80
Theater	1049	Halogen 100W	165
		Florescence	90
		Halogen 40W	40
		Spot lights 12V	30
		Spot lights 240V	40
		Halogen 80W	136
Outdoor areas		Fixtures	42
		Floor Lighting	6

The Town Hall was built in 2005. Characterized by the use of concrete, bricks and large glass surfaces. The Municipal Theatre where performances take place is under the same building. The offices cooling and heating is made by VRV system while a boiler and Chiller is used for the theatre. The building features photovoltaic system for outdoor lighting of the building.

Table 3 Description of Multi service center "Constantinos Kapodistrias»

PLACE	AREA m2	TYPE OF LUMINAIRES	QUANTITY
Halls	140	Internal	
		Fluorescent lamps	12
		Spot lights	20
		External	
		Spot lights	13
		Luminaires	3
		Fluorescent lamps	6
The building was renovated in 2006			

Table 4 Description of Chorus Center

PLACE	AREA m^2	TYPE OF LUMINAIRES	QUANTITY
Hall	125	Fluorescent lamps	20
Old Building which was renovates in 2007			

Table 5 Description of Art Workshop

PLACE	AREA m^2	TYPE OF LUMINAIRES	QUANTITY
Hall	78	Fluorescent lamps	5
Old building which was renovated in 2003. It has solar panels for hot water demand.			

Table 6 Description of Warehouse

PLACE	AREA m^2	TYPE OF LUMINAIRES	QUANTITY
Warehouse	**630**	**Interior**	
		Compact fluorescent lamps 20W	29
		Small projectors	**6**
		Projectors 400W	4
Offices	**300**	**External**	
		Sodium Projectors 1000W	3
		Sodium Lamps 70W	**20**
The warehouses of the Municipality were built in 1998. The building has solar panels for hot water demand.			

Table 7 Description of Sport Hall Sotiris Messios

PLACE	AREANm^2	TYPE OF LUMINAIRES	QUANTITY
Basement (engine room)	**205**	Fluorescent tubes 5 ft	**8**
Stadiums	1869	Spot lights 2X18W	23
		Fluorescent tubes 2 ft	**4**
		Fluorescent tubes 5 ft (single)	54
		Fluorescent tubes ft (double)	**11**
Auxiliary areas	1088	Fluorescent tubes 2 ft (2X18W)	31
		Φώτα 1X60W	**18**
		Spots 1X26W	114
		Exit signs 1X8W	**28**
		Projectors 1X400W	16
		Projectors 1X300W	**31**
Grandstands	400	Projectors 1X250W	25
		Outdoor columns	**42**
		Stage lights	4
The Sport Hall were built in 2005 and is heated by a central heating system and cooled with individual air conditioners			

4.2 Latsia Municipality Street Lighting

The total energy consumption in 2009 for street lighting was equal to 1.531.000 kWh.

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

Table 8 Lamp types in the buildings of Latsia Municipality Latsia

TYPE OF LUMINAIRES	BULB POWER
HPS *	250 W
HPS	150 W
HPS	70 W
Compact	21 W

* High pressure sodium

OPERATING HOURS: According to data from the EAC, the bimonthly valorisation of streetlights in the city belongs to Code 35. Under the tariff will provide power for lamps daily half hour after sunset until half an hour before sunrise.

The period of power can be increased from sunset to sunrise when requested by the municipality.

4.3 Lighting of parks and public spaces of the Latsia Municipality

Table 9 Lighting municipal stadium

SPACE	AREA m^2	TYPE OF LUMINAIRES	QUANTITY
Changing rooms	120	Tubular Fluorescent Lamps	20
Free Space	9500	Pillars of 7 projectors	4
Auxiliary stadium	2500	Pillars of 5 projectors 1000W	4
Construction year 1994			

Table 10 Lighting municipal Park

SPACE	AREAm^2	TYPE OF LUMINAIRES	QUANTITY
Melina Mercury	**120**	**20W fluorescent fixtures**	**13**
Bank of Cyprus	9500	**20W fluorescent fixtures**	48

4.4 Building permits in Latsia municipality

In the table below, provide information about applying for planning permission for the erection of new houses in the Municipality and also provided data for the construction of new buildings and conversion of existing buildings / dwellings in apartment buildings:

Table 11 Latsia Municipality Building permits

PERIOD	HOUSES	APARTMENT BUILDING
1/1/1952 – 31/12/2006	3549	179
1/1/2007-31/12/2009	330	143

4.5 Latsia Municipality Vehicles

- The municipality maintains vehicles and machinery of various types, uses and engine displacement as individual scavengers, excavators etc, which use oil for their operation.

- The movement of workers diverse with passenger vehicles or four-wheel drive.

- Measurements for fuel for vehicles and engines of the Municipality for 2009 showed that consumed 55,510 liters of oil and about 4,150 gallons of gasoline. This amounts to about € 45.000 for oil and € 4.230 for gasoline. Also in the following graph shows the seasonal variation in the consumption of gasoline.

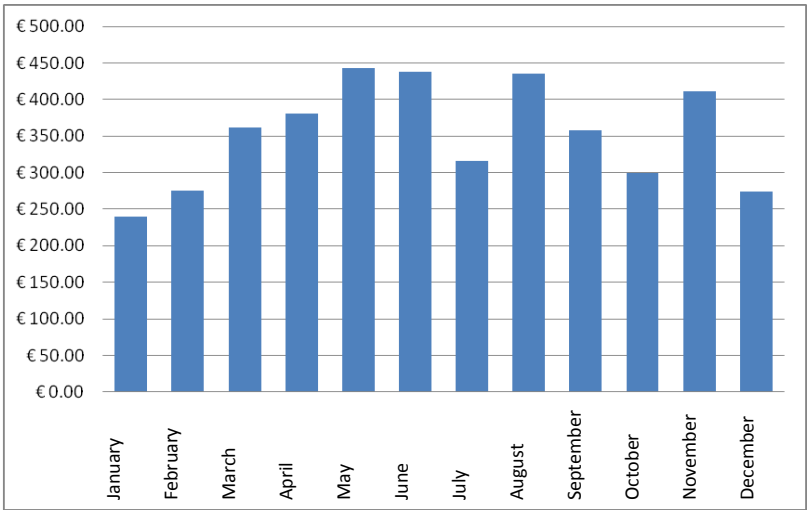
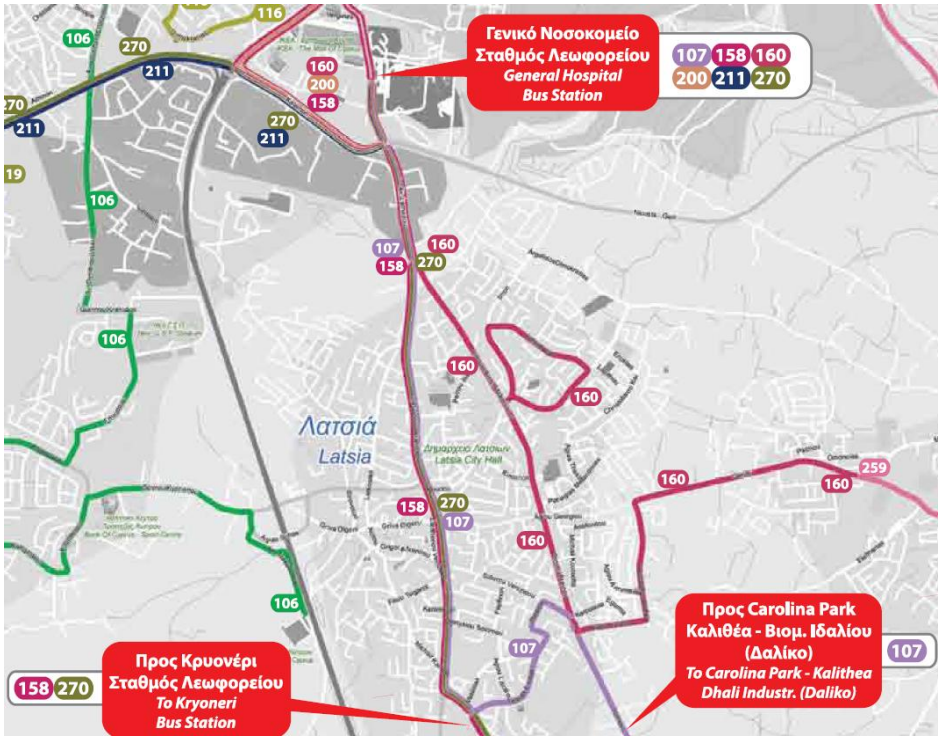


Figure 21 Gasoline consumption in Latsia Municipality for gasoline vehicles

4.6 Public transport in the municipalities of Greater Nicosia

Public transport in the Municipality Latsia ton made by Nicosia District Communications Agency (O.S.E.L). Future goals of O.S.E.L. are the strengthening of public passenger transport and to increase the use of the bus by 2% today to 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.

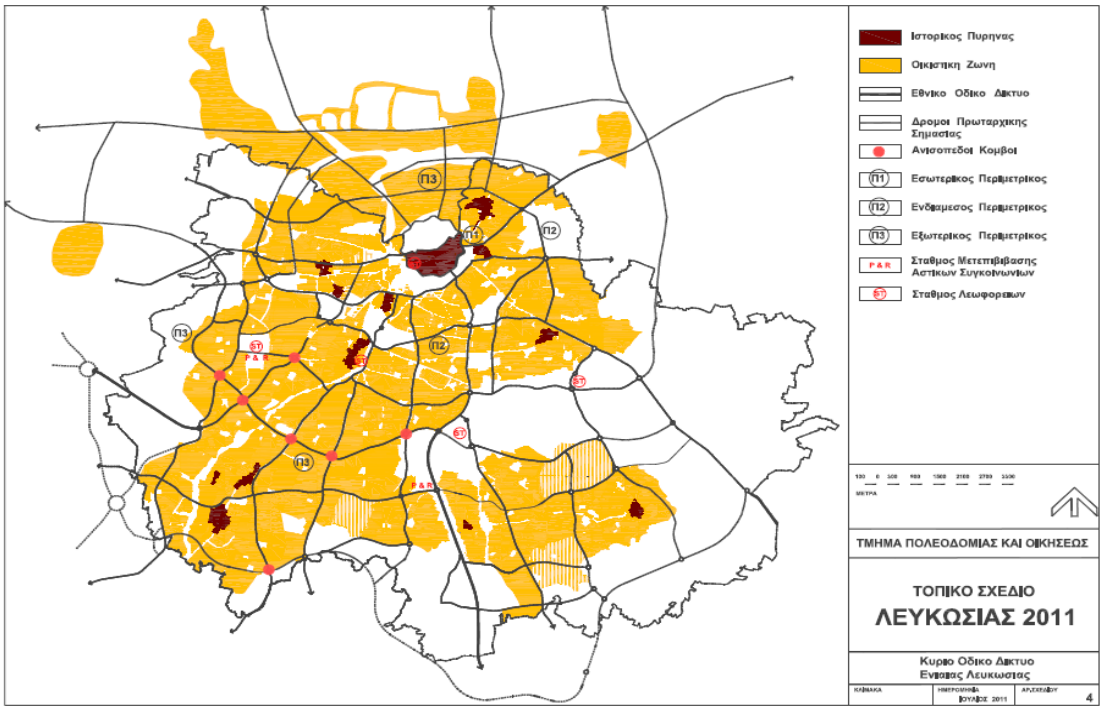
Even to enhance a driver through frequent training of staff at all levels. We tried through various programs through the Department of Education and the Ministry of Communications to promote and consolidate the use of the bus for children, changing the culture of using public means of transport.



Picture 22 Latsia Municipality Map routes [Source: www.osel.com.cy]

4.7 Latsia Municipality Road Network

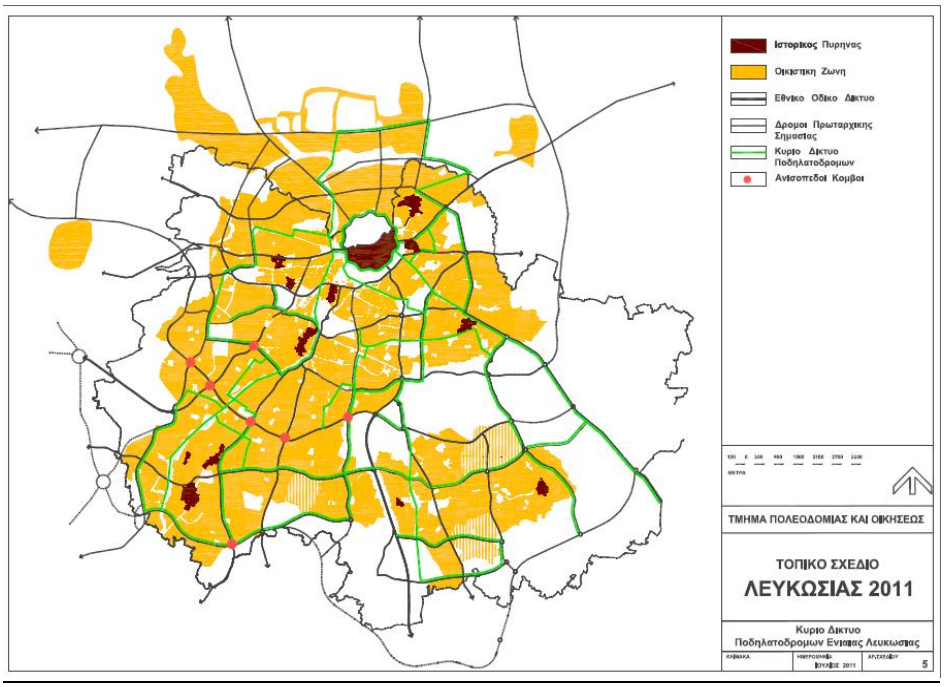
The design of Latsia road network guideline is at local project part of Nicosia. The following map shows the main roads of Nicosia.



Picture 23 Nicosia Local Plan (Main Roads for Single Nicosia)

4.8 Latsia Municipality cycle paths Network

The cycle network which provides the Local Plan Nicosia shown in map below:



Picture 24 The cycle network of Nicosia

4.9 Solid waste production and management at Latsia Municipality

Regarding the production of household waste at a Municipal and Community level, the available data is for the Nicosia area and relates to the quantities produced in the municipalities and communities of Nicosia, which are driven to the disposal area of Kotsiatis (data up to 1999). This data is available from the Statistical Service of Cyprus and come from measurements made by the Municipality of Nicosia (daily weightings of garbage trucks entering the garbage disposal site for one week). The purpose of these measurements was the calculation of the annual quantity of waste going to the disposal site by the municipalities and communities in order to determine the corresponding disposal fees per Municipality and Community.

Based on the data of Table 4, it seems - as expected- that the quantities of household waste are increasing over time and have almost doubled from 1991 to 1999. This is mainly due to the population increase in Nicosia, the improvement of living standards and the absence of any recycling program.

Table 12 **Quantities of household waste driven at the disposal areas in the Nicosia district (tons/year)**

Municipalities and wider Nicosia area	**1991**	**1994**	36.266
Nicosia Municipality	27.361	30.377	40.522
Strovolos Municipality	20.499	24.560	10.534
Egkomi Municipality	4.730	6.544	8.224
Agios Dometios Municipality	5.403	4.515	14.451
Aglantzia Municipality	5.663	6.490	**13.067**
Latsia Municipality	**3.064**	**3.892**	**12.839**
Lakatamia Municipality	5.047	8.614	2.361
Deutera-Anthoupoli Complex	4.472	1.565	6.900
Dhali-Pera Chorio Complex	4.129	3.949	3.427
Lythrodontas Complex	2.444	3.028	1.970
Ergates Complex		1.940	1.170
Kornos Complex		712	1.716
Geri Improvement Board	1.352	1.262	754
Klirou Improvement Board	332	286	369
Gouri-Kalo Chorio		317	312
Mathiatis			520
Palaichori			
Arediou		260	
Ergates Industrial Area		478	**155.402**
TOTAL	**84.496**	**98.789**	

[Source: Statistical Service Cyprus]

Detailed information for waste management data collection of Latsia municipality:

Table 13 Weight of waste collected by waste collection vehicles in the municipality.

Year	Weight in kg
2005	6294509
2006	7195760
2007	7973420
2008	7814040
2009	6972680

Number of trips per year: 936 routes.

Weight of recyclable waste.

Collection of recyclables materials started from Latsia Municipality in 1993 with the collection of old metal and aluminum objects. Then the city was involved in the program **«HEALTHY CITIES»** United Nations from 1996 to 1998, where the recycling of metals. Recycling aluminum cans and scrap metal continues until today. Collected since then 64.030Kg aluminum cans and old metal objects.

Then the municipality was involved in the program **«LIFE»** from 1/3/2001 until 31/12/2004. For the LIFE program initially maintained on data but then there are no analytical details.

From 1/9/2006 to 31/8/2008 the municipality participated in the **National Waste Management Pilot Program Packaging** in the Environment Agency of the Ministry of Agriculture. The data shown in the table below.

Table 14 National recyclable programme.

Year	Class (kg)	Metal (kg)	Plastic (kg)	Paper/ Cardboard (kg)
2006	1.097	446	2.892	738
2007	3.312	3.108	15.813	29.809
2008	3.743	5157	11.892	41.735

Number of routes: A route to glass and metals week. Two routes paper and plastic week.

From 1/10/2008 and the municipality began Latsia recycling program carried out by the company «Green Dot», which continues until today .The data shown in the table below.

Number of routes: A route for glass and for metals per week. Two routes for paper and for plastic per week.

From 1/10/2008 and the municipality began Latsia recycling program carried out by the company «Green Dot», which continues until to Number of routes: A route to glass and metals week. Two routes paper and plastic week.

Table 15 Recycling Program Green Dot

Year	Glass (kg)	PMD (kg)	Paper/ Cardboard(kg)
2008	2.349	96.684	12.511
2009	44.888	233.728	145.069

Number of paths to collect the PMD: For the year 2009 52 tracks.

Number of routes for collection of paper: For the year 2009 24 tracks.

4.10 Latsia Municipality Population

Latsia Municipality has more than 12,500 to 13,000 inhabitants. However, in 1881 (year of the first census in Cyprus), had only 17 inhabitants. Below are the numbers of the population and population growth for the past 120 + years:

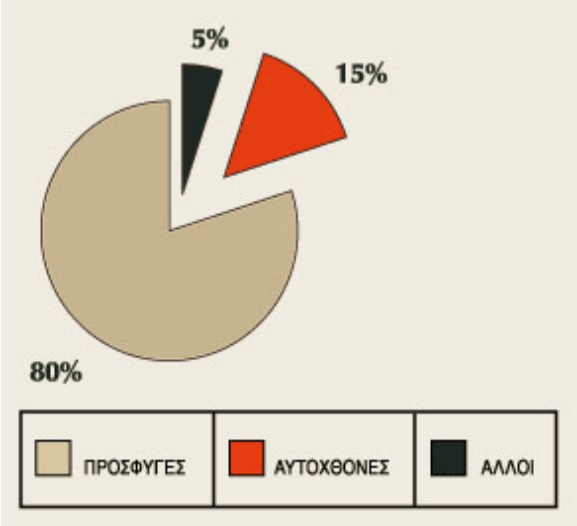


Table 16 Population development in Latsia Municipality

Year	Residents	Year	Residents	Year	Residents	Year	Residents
1881	17	1921	53	1973	1.108	2001	12.195
1891	40	1931	350	1976	2.163	2003	>12.500
1901	47	1946	179	1982	7.558		
1911	48	1960	485	1992	10.012		

Significant changes in the number of people between 1921-1982. This is due to many factors, which are explained below:

a) Between 1921-1931 more and more people from Lythrodontas having significant real estate in Latsia moved Latsia, looking for a new and better life, also due to the low price of land and their agricultural investments.

b) Between 1931-1946 the population declined because of the war and the fact that many Cypriots emigrated to the USA, Australia, Europe and the Arab countries to find better jobs and, thus, better lives.

c) From 1946 until the year of independence, the population increased because Latsia located near the center of Nicosia and the traditional workplace, offering also rural and farming operations.

d) From 1960 until 1973, a year before the Turkish invasion, the increase is quite large, but can not be compared with the dramatic growth between 1976-1982, because shortly after the Turkish occupation number of refugee settlements built in Latsia, increasing population so dramatically.

e) From 1976 onwards, another factor contributed to the huge increase in the population of Latsia • the excellent road network, providing easy access to Nicosia, as well as Larnaca and Limassol.

f) In the last 5-10 years, the population seems to be increasing due to another factor: many foreigners (mainly blacks) are installed in Nicosia and its suburbs, working as gardeners, domestic workers and laborers.

In order to house refugees after the Turkish invasion, the government built several refugee camps in the island. Three of them were built in Latsia: the 'Agios Eleftherios "(with 796 dwelling units), the" St. Andrew "(with 236 dwelling units) and" St. Luke "(with 126 residential units). Moreover, the self-help housing "Archangel Michael" (two phases) was funded by the government (247 housing units). It is estimated that 76-82% of the population comes from 125 Latsia occupied villages

[Source: http://www.latsia.org.cy]

4.11 Environmental campaign for information and awareness

Informed the residents through distribution of brochures and means of media. For the pilot program for the management of packaging waste (state program) printed four leaflets different content each and distributed 4500 leaflets in all premises of the municipality and 2065 average public school elementary and secondary education. Was a presentation of the state plan and informative lecture hall in the municipal theater Latsia. In October 2009 there were small events in four primary schools in the municipality and delivered 99 bins for recycling paper and PMD, donated by the municipality.

The Green Dot campaign has the media and leaflets distributed to all premises in the municipality.

4.12 Green Public Procurement

Latsia Municipality in the contract for purchase of goods and services promotes green procurement in areas such as purchasing energy-efficient computers, recycled paper, etc.

4.13 European and International Programmes

Latsia Municipality participates in the following European and international programs:

The Covenant of Mayors European Commission's initiative to establish a permanent cooperation network between European Municipalities against Climate Change. The commitments undertaken by municipalities are exceeding the goals of the EU to reduce emissions of carbon dioxide (CO2) in their territories in more than 20% through measures to promote Energy Efficiency and Renewable Energy.	Σύμφωνο των Δημάρχων Υπέρ της Τοπικής Βιώσιμης Ενέργειας	www.eumayors.eu
Pact of Islands The ISLE-PACT project aims to develop islanders Sustainable Energy Action Plans to meet or exceed the sustainability objectives of the EU set for 2020, reducing CO2 emissions by at least 20%	ISLEPACT SUSTAINABLE ENERGY ACTIONS FOR ISLANDS	www.islepact.eu
Medeea The overall objective of the project is to achieve MEDEEA European objective "20-20-20" Joined Mediterranean regions, through the involvement of local authorities on energy issues by implementing energy planning tool European Energy Award-eea ®.	medeea	www.interregmedeea.eu

5 Inventory of consumption in Latsia municipality

5.1 Residential sector

Table 17 Energy demand in the residential sector MWh for 2009

Description	Electricity	Oil products	Liquefied Petroleum Gas	Solar	Geothermal	Biomass	**Total**
Hot Water usage	898	786	56	3.649	28	196	**5.613**
Heating and cooling	21.559	12.860	1.513	113	76	1.891	**38.012**
Lighting	1.198	-	-	-	-	-	**1.198**
Kitchen	898	-	385	-	-	0	**1.283**
Electrical appliances	5.390	-	-	-	-	-	**5.390**
Total	**29.943**	**13.646**	**1.954**	**3.762**	**104**	**2.087**	**51.496**

5.2 Primary sector

Table 18 Energy demand in the primary sector MWh for 2009

Description	Electricity	Oil Products	Diesel	Liquefied Petroleum Gas	Biomass	**Total**
Agriculture, Forestry and Fisheries	660	219		81	264	**1.224**
Mines and Quarries	0	0	0	0		**0**
Total	**660**	**219**	**0**	**81**	**264**	**1.224**

5.3 Secondary Sector

Table 19 Energy demand in MWh in the secondary sector for the year 2009

Description	Electricity	Oil Products	Diesel	Liquefied Petroleum Gas	Biomass	**Total**
Processing	24.581	8.143	3.030	1.084	361	**37.199**
Water supply, sewerage and waste management	7	2	1			**10**
Construction	82	27	10			**119**
total	**24.670**	**8.172**	**3.041**	**1.084**	**361**	**37.328**

5.4 Tertiary sector

Table 20 Energy demand in MWh in the Tertiary sector for the year 2009

Description	Electricity	Oil Products	Diesel	Liquefied Petroleum Gas	Biomass	**Total**
Wholesale and retail trade, repair of motor vehicles and motorcycles	6.293	2.085	776	270	90	**9.514**
Hotels and restaurants	1.727	572	213	74	25	**2.611**
Public administration and social security	2.674	886	330	115	38	**4.043**
Defense, Justice, Police and Fire	53	18	7	2	1	**81**
education	6.217	2.060	766	266	89	**9.398**
Men Health and Social Care	23.440	7.765	2.890	1.005	335	**35.435**
Other Services	9.699	3.213	1.196	416	139	**14.663**
Public Lighting	1.531					**1.531**
total	**51.634**	**16.599**	**6.178**	**2.148**	**717**	**77.276**

5.5 Transports

Table 21 Final energy consumption in MWh for 2009 in transport

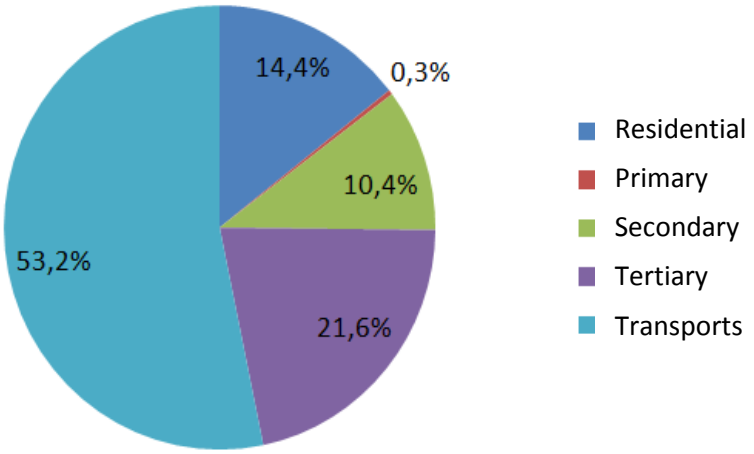
Description	Electricity	Diesel	Gasoline	Biomass	**Total**
Urban and suburban passenger transport services	16	1.617	2.193		**3.826**
Other passenger services (taxi, tourism, school buses, etc.)	0	25.876	35.087		**60.963**
Commercial ground transport services	0	0	0		**0**
Private vehicles	0	53.368	72.368		**125.736**
Total	**16**	**80.861**	**109.648**		**190.525**

5.6 Total final energy consumption in Latsia municipality

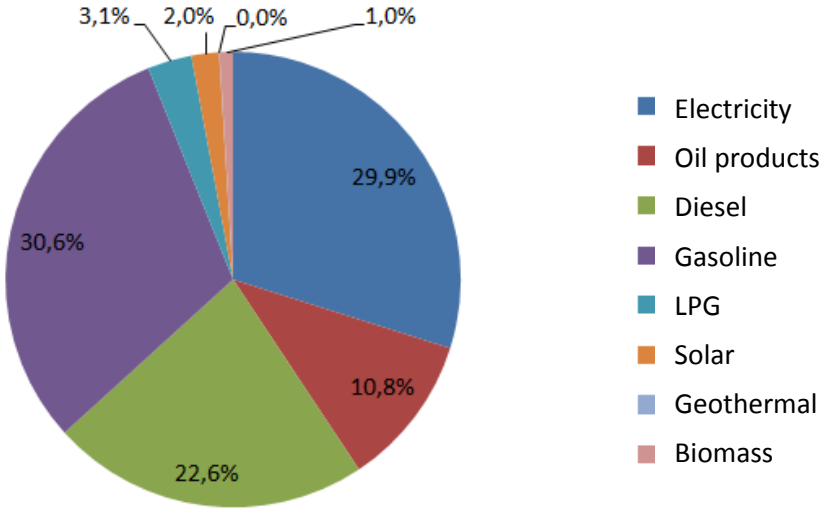
Table 22 Final energy consumption in transport in MWh for 2009

Sector	Electricity	Oil Products	Diesel	Gasoline	Liquefied Petroleum Gas	Solar	Geothermal	Biomass	**Total**
Residential	29.943	13.646	-	-	1.954	3.762	104	2.087	**51.496**
Primary	660	219	0	-	81	-	-	264	**1.224**
Secondary	24.670	8.172	-	-	3.041	1.084	-	361	**37.328**
Tertiary	51.634	16.599	-	-	6.178	2.148	-	717	**77.276**
Transforms	16	-	80.861	109.648	-	-	-	-	**190.525**
Total	**106.923**	**38.636**	**80.861**	**109.648**	**11254**	**6.994**	**104**	**3429**	**357.849**

Picture 25 Share of final energy consumption by sector in 2009



Picture 26 Share of final energy consumption by energy source in 2009



6 Census of CO2 emissions in Latsia 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 23 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 24 Tons of CO2 emissions for the residential sector for the year 2009

Description	Electricity	Oil products	Liquefied Petroleum Gas	Solar	Geothermal	Biomass	**Total**
Hot Water usage	785	219	13	-	-	-	**1.017**
Heating and cooling	18.842	3.588	363	-	-	-	**22.793**
Lighting	1.047	-	-	-	-	-	**1.047**
Kitchen	785	-	92	-	-	-	**877**
Electrical appliances	4.711	-	-	-	-	-	**4.711**
Total	**26.170**	**3.807**	**468**	**-**	**-**	**-**	**30.445**

6.3 Primary Sector

Table 25 Tons of CO2 emissions in the primary sector for the year 2009

Description	Electricity	Oil Products	Diesel	Liquefied Petroleum Gas	Biomass	**Total**
Agriculture, Forestry and Fisheries	577	61	0	20	-	**658**

Mines and Quarries	0	-	0	0	-	**0**
Total	**577**	**61**	**0**	**20**	**-**	**658**

6.4 Secondary section

Table 26 Tons of CO2 emissions in the secondary sector for the year 2009

Description	Electricity	Oil products	Liquefied Petroleum Gas	Solar	Geothermal	Biomass
Processing	21.484	2.272	727	-	-	**24.483**
Water supply, sewerage and waste management	6	1	0	-	-	**7**
Construction	72	8	2	-	-	**82**
Total	**21.562**	**2.281**	**729**			**24.572**

6.5 Tertiary sector

Table 27 Tons of CO2 emissions in the tertiary sector for the year 2009

Description	Electricity	Oil products	Liquefied Petroleum Gas	Solar	Biomass	**Total**
Wholesale and retail trade, repair of motor vehicles and motorcycles	5.500	582	186	-	-	**6.268**
Hotels and restaurants	1.509	160	51	-	-	**1.720**
Public administration and social security	2.337	247	79	-	-	**2.663**
Defense, Justice, Police and Fire	46	5	2	-	-	**53**
Education	5.434	575	184	-	-	**6.193**
Men Health and Social Care	20.487	2.166	694	-	-	**23.347**
Other Services	8.477	896	287	-	-	**9.660**
Public Lighting	1.338	-	-	-	-	**1.338**
Total	**45.128**	**4.631**	**1.483**	**-**	**-**	**51.242**

6.6 Transports

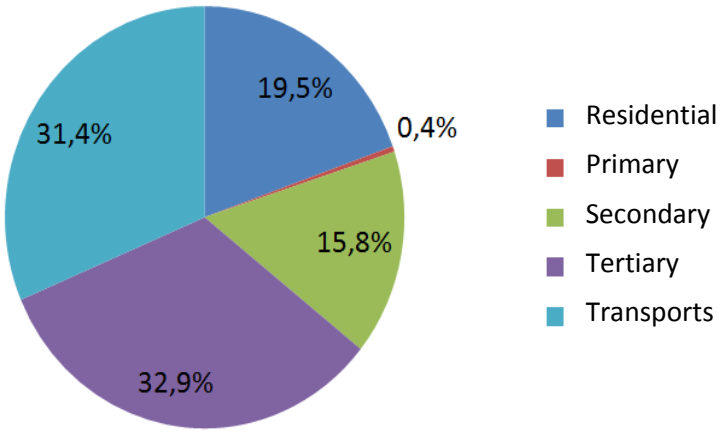
Table 28 Tons of CO2 emissions in transport for 2009

Description	Electricity	Diesel	Gasoline	Biomass	**Total**
Urban and suburban passenger transport	14	432	546	0	**992**
Other passenger services (taxi, tourism, school buses, etc.)	0	6.909	8.737	-	**15.646**
Commercial ground transport services and displaced	-	-	-	-	**-**
Private vehicles	-	14.249	18.020	-	**32.269**
total	**14**	**21.590**	**27.303**	**-**	**48.907**

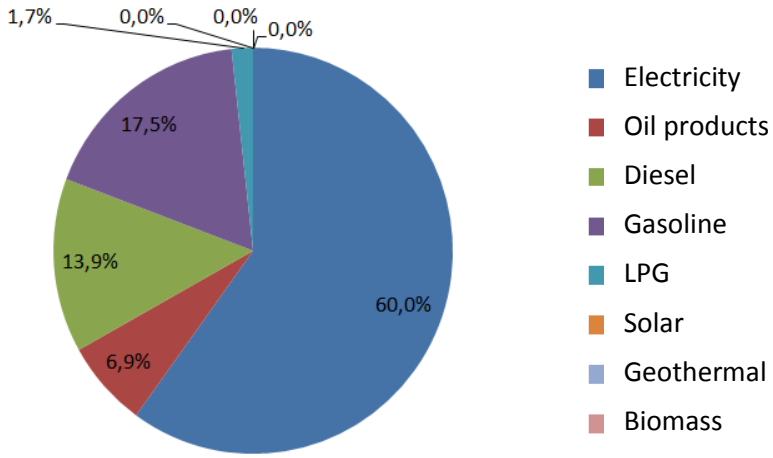
Table 29 Total CO2 emissions in Latsia municipality

Sector	Electricity	Oil Products	Diesel	Gasoline	Liquefied Petroleum Gas	Solar	Geothermal	Biomass	**Total**
Residential	26.170	3.807	-	-	468	-	-	-	**30.445**
Primaryς	577	61			20				**658**
Secondary	21.562	2.281			729				**24.572**
Tertiary	45.128	4.631			1.483				**51.242**
Transports	14		21.590	27.303					**48.907**
Total	**93.451**	**10.780**	**21.590**	**27.303**	**2.700**				**155.824**

Picture 27 Share of CO2 emissions by sector in Latsia Municipality for 2009



Picture 28 Share of CO2 emissions per energy source in Latsia Municipality for 2009



6.7 Forecasting Scenario for CO2 emissions

To predict the CO2 emissions in the period 2010 to 2020, established the expected evolution scenario includes the following key assumptions:

1. Using annual growth rates of energy consumption by sector based on available statistical data were available to the researchers in the preparation of the Energy Action Plan (see Table 30)

2. Using annual rates of increase of energy efficiency in final use by improving existing technologies (see Table 31)

3. Estimated rate of return to power stations in Cyprus in the coming years considering the improvement of technology, modernization of existing equipment (see Table 32).

4. The gradual introduction, use and integration into power system of gas.

Table 30 Growth rates of energy consumption per consumer scenario used in the expected evolution

Description field	**Estimated annual growth rate of energy consumption**
Residential	
Hot Water	2,5%
Heating and cooling	2,5%
Lighting	2,5%
Cooking	2,5%
Refrigerators and freezers	2,5%
Washers and dryers	2,5%
Dishwashers	2,5%
Televisions	2,5%
Other electrical appliances	2,5%
Primary sector	
Agriculture, forestry and fishing	1,5%
Mining and quarrying	0,0%
Secondary sector	
Processing	2,5%
Water supply, sewerage, waste management and remediation activities	1,0%
Construction	2,0%
Tertiary sector	
Wholesale and retail trade, repair of motor vehicles and motorcycles	2,0%
Service activities Accommodation and food services	1,0%
General public administration and social security	2,0%
Defense services and justice, and police bodies	1,0%

Education	1,5%
Activities related to human health and social care	2,5%
Other services	2,0%
Municipal / Public Lighting	2,5%
Transportation (vehicles)	
Private transport	2,5%
Urban and suburban passenger land transport	1,0%
Other road passenger transport services (taxis, tourism, school buses, etc.)	2,0%
Freight transport by road and removal services	0,0%
Secondary energy	
Solar energy to generate electricity	3,0%
Wind energy to generate electricity	1,0%
Solar energy for heating and cooling	3,0%
Geothermal heating and cooling	0,0%

Table 31 Increasing efficiency in end-use energy (reduction of final energy for the same useful energy)

Description field	**Estimated annual growth rate of energy consumption**
Residential	
Hot Water	0,5%
Heating and cooling	0,5%
Lighting	0,5%
Cooking	0,5%
Refrigerators and freezers	0,5%
Washers and dryers	0,5%
Dishwashers	0,5%
Televisions	0,5%

Other electrical appliances	0,5%
Other services	0,5%
Municipal / Public Lighting	0,5%
Transportation (vehicles)	
Private transport	0,5%

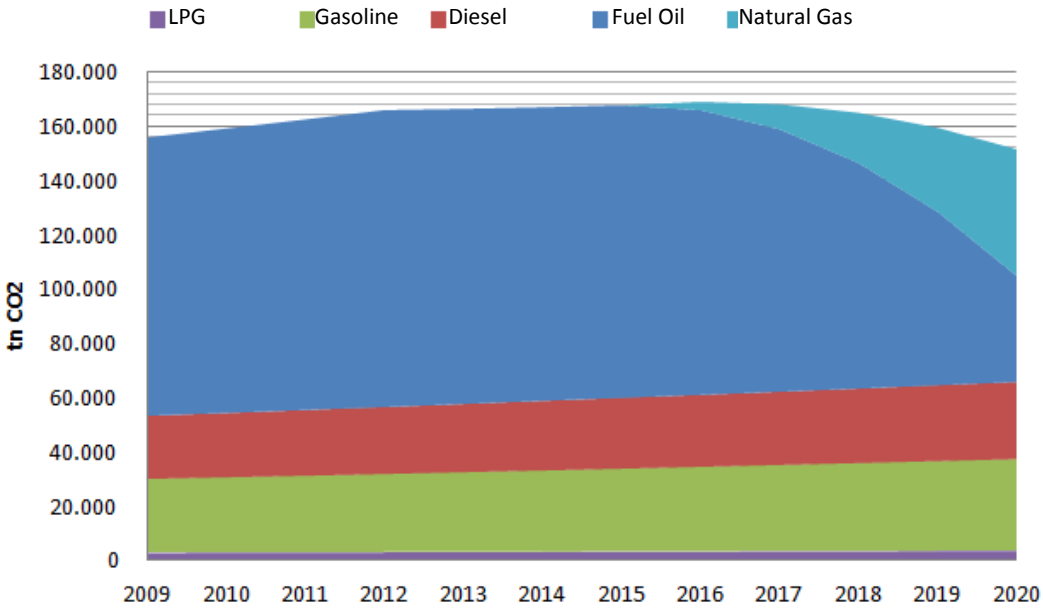
Table 32 Factors for energy efficiency for electricity production

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

Table 33 Expected evolution scenario for forecasting CO2 emissions for the period 2009 to 2020

Year	Petroleum Products	Petroleum	Gasoline	LPG	Natural Gas	Total	Increase relative to 2009
2009	102.631	23.189	27.302	2.701	0	**155.823**	0
2010	104.865	23.649	27.841	2.760	0	**159.115**	2%
2011	107.149	24.119	28.390	2.821	0	**162.479**	4%
2012	109.484	24.598	28.950	2.883	0	**165.915**	6%
2013	108.297	25.087	29.521	2.947	0	**166.393**	7%
2014	108.297	25.585	30.103	3.012	0	**166.997**	7%
2015	107.913	26.024	30.697	3.079	0	**167.712**	8%
2016	105.021	26.475	31.302	3.147	3.079	**169.023**	8%
2017	96.817	26.938	31.920	3.216	9.261	**168.152**	8%
2018	83.187	27.413	32.550	3.287	18.572	**165.009**	6%
2019	64.011	27.901	33.192	3.360	31.038	**159.502**	2%
2020	39.166	28.401	33.847	3.435	46.688	**151.537**	-3%

Picture 29 Scenario Expected evolution to predict the CO2 emissions for the period 2009 – 2020



7 Energy Action Plan for Latsia Municipality from 2011 to 2020

7.1 Introduction

The Energy Action Plan has been prepared for the municipality includes additional measures / actions to achieve at least the European target to combat climate change. That is, the 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 is 2009.

Emissions reference year 2009 (tn CO_2/year)	**Expected emissions year 2020** (tn CO_2/year)	**2020 emissions target** (tn CO_2/year)	**Desired minimum (20%) reduction in emissions** (tn CO_2/year)
157.832	153.557	126.257	31.556

The contribution of national measures are estimated and included in the Energy Action Plan but the municipality can determine the achievement of national goals. However, several of the proposed measures will be implemented at the local level will act supportive and complementary to national measures so as to be able to achieve the objectives.

The measures are divided in the following main areas:

- Energy savings in public buildings
- Energy-saving campaigns
- Energy savings in transport
- Energy conservation in street lighting
- Investments in Renewable Energy
- Development of green spaces

7.2 Energy saving in public buildings

Measure EE 1 - Interventions heat insulation at Town Hall

Building Description	
Year of built:	2005
Building area	Basement 1661 m^2 Offices 1860 m^2 Theatre 1049 m^2
Uses	Offices (office hours) and theater (especially at night)
Cooling / heating offices	With VRV air conditioners
Cooling / heating of theater	With VSE oil boiler and chillers
Electricity power consumption	Electricity: 363.050 kWh/year Petroleum: 74.000 kWh/year

Was examined the thermal installation roof

The indirect cost of the measure is not very significant because it requires (a) the preparation conditions for receipt of tenders (b) tender evaluation by technical and economic criteria,

Implementation of the measure in 2012

Measure Code	**EE 1**		
Measure Name	**Thermal insulation interventions at Town Hall**		
COST OF APPLICATION			
Cost of investment	**Area (m^2)**	**Cost (€/m^2)**	**Total (€/m^2)**
Roof thermal insulation (without sponsorship)	1600	15 €/m^2_{roof}	**24.000**
Cost of operation			
Roof thermal insulation	**0 €**		
Indirect cost			
	☐ **– High** ☐ **– Medium** ☒ **– Low**		
BENEFIT FROM APPLICATION			
Energy	Heated area (m^2)	Profit (kWh/$m^2_{heated\ area}$· year)	**Energy Saving (kWh/year)**
Roof thermal insulation (without sponsorship)	2900	32.5	**94.300**
Financial	Energy Saving (kWh/year)	Average electricity price (€/kWh)	**Saving (€/year)**
Roof thermal insulation	94.300	0.11	**10.373**
Environmental	Emission reduction factor ($kg_{CO2}/m^2_{h.a}$.year)	Heated space (m^2)	**Emissions saving (kg_{CO2}/ year)**
Roof thermal insulation	17.4	2900	**50.371**
RESULTS – EVALUATION			
Unit Cost (€/$kgCO_2$) ***Roof insulation***	**0.48 €/ $kg_{CO2\ annual\ saving}$**		**Proposed for implementation** ☒
MEASURE TO IMPLEMENT - EE1 Insulation interventions at the Town Hall and Theatre			
Total Cost **24.000 €**	**Saving** **10.373 €**	**Emissions Reduction** **50.371 Kg_{CO2}/ year**	**Repayment / depreciation** **2.3 years**

Measure EE 2 Interventions thermal insulation in municipal Warehouses

Building Descriptions	
Area building	Warehouse: 630 m^2 Offices: 300 m^2
Uses	Warehouse and Offices
Power Consumption	25.760 kWh/Year

Examined the thermal insulation roof space of the offices.

The indirect cost of the measure is not very significant because it requires (a) the preparation conditions for receipt of tenders (b) tender evaluation by technical and economic criteria.

Implementation of the measure in 2012

Measure Code	EE2		
Measure Name	Interventions insulation in municipal Warehouses		
ΚΟΣΤΟΣ ΕΦΑΡΜΟΓΗΣ			
Cost of investment	**Area (m^2)**	**Cost (€/m^2)**	**Total (€)**
Roof thermal insulation (without sponsorship)	300	15 €/m^2_{roof}	**4.500**
Cost of operation			
Roof insulation	**0 €**		
Indirect costs			
Roof insulation	☐ **– High** ☐ **– Medium** ☒ **– Low**		
APPLICATION BENEFIT			
Energy	Heated area (m^2)	Profit (kWh/$m^2_{heated\ area}$·year)	**Energy Saving (kWh/year)**
Roof insulation	**300**	**18.5**	5560
Financial	Energy Saving (kWh/year)	Average electricity price (€/kWh)	**Saving (€/year)**
Roof insulation	**5560**	**0.13**	723
Environmental	Emission reduction factor ($kg_{CO2}/m^2_{h.a}$.year)	Heated space (m^2)	**Emissions saving (kg_{CO2}/ year)**
Roof insulation	9.9	300	**2969**

RESULTS – EVALUATION		
Unit Cost (€/kgCO_2) ***Roof insulation***	**1.51 €/ $kg_{CO2\ annual\ saving}$**	**Proposed for implementation** ☒

MEASURE TO IMPLEMENT – EE2 Roof insulation at Town Hall			
Total Cost **4.500 €**	**Saving** **723 €**	**Emissions Reduction** **2969 Kg_{CO2}/ year**	**Repayment / depreciation** **6.2 years**

Measure: EE 3 - Electricity saving in the Town Hall Building

Building Description	
Electricity Consumption	363.050 kWh/year

Was (a) the establishment corrector voltage and (b) replacement of conventional lamps (250 lamps).

The indirect cost of the measure is not very significant because it requires (a) the preparation conditions for receipt of tenders (b) tender evaluation by technical and economic criteria.

Implementation of the measure in 2012

Measure Code	EE3		
Measure Name	Electricity Saving in the Building of Town Hall		
APPLICATION COST			
Investment Cost	Total (€)		
(a) Voltage Regulator (no subsidy)	30.000		
(b) Lamp Replacement (no subsidy)	1.125		
Operation Cost			
(a)Voltage Regulator	0 €		
(b) Lamp Replacement	0 €		
Indirect Cost			
	☐ **– High** ☐ **– Medium** ☒ **– Low**		
APPLICATION BENEFIT			
Energy	**Area (m^2)**	**Profit (kWh/m^2.year)**	Energy saving (kWh/year)
(a)Voltage Regulator	**2909**	**8.0**	23.246
(b) Lamp Replacement	**2909**	**0.7**	1.940
Financial	Energy saving **(kWh/year)**	**Average electricity price (€/kWh)**	Saving (€/year)
(a)Voltage Regulator	**23.246**	**0.13**	3.022
(b) Lamp Replacement	**1.940**	**0.13**	252
Environmental	Emission reduction factor **(kg_{CO2}/m^2.year)**	**Area (m^2)**	**Emissions saving** (kg_{CO2}/ year)
(a)Voltage Regulator	**6.3**	**2909**	18.341
(b) Lamp Replacement	**0.5**	**2909**	1.508
RESULTS – EVALUATION			
Unit Cost (€/$kgCO_2$)		**Proposed**	**for**

(a) Voltage Regulator ***(b) Lamp Replacement***	**1.63 €/ $kg_{CO2\ annual\ saving}$** **0.74 €/ $kg_{CO2\ annual\ saving}$**	**implementation** ☒ ☒
MEASURE TO IMPLEMENT – EE3 Electricity Saving in the Town Hall Building		
Total Cost **31.125 €**	**Saving** **3.274 €**	**Emissions Reduction** **19.849 Kg_{CO2}/ year**	**Repayment / depreciation** **9.5 years**

Measure: EE 4 – Renewable Electricity with Photovoltaics on Municipal Buildings

This included the installation of electricity with photovoltaic panels. The total installed power is 20 kW and will cover an area of approximately 200 m^2.

The indirect cost of the measure is not very significant because it requires (a) the preparation conditions for receipt of tenders (b) tender evaluation by technical and economic criteria, (c) completion form (request) to secure grants from the Grant Scheme 2009-2013 the MCIT. It must also be the process of linking the PV EAC network.

Photovoltaic systems are sold to a grant kWh (price € 0, 35). Implementation Period 2012-2015

Measure Code	EE4		
Measure Name	Renewable electricity in buildings of the Municipality		
APPLICATION COST			
Investment Cost	Total (€)		
Photovoltaic System 20 kW (no subsidy)	50.000		
Operation Cost			
Photovoltaic System 20 kW	0 € (negligible cost for periodic module cleaning)		
Indirect Cost			
	☐ **– High** ☒ **– Medium** ☐ **– Low**		
APPLICATION BENEFIT			
Energy	Power (kW)	Electricity Generation (kWh/kW.year)	**Green Energy (kWh/year)**
Photovoltaic System 20 kW	**20**	**1500**	30.000
Financial	Green Energy (kWh/year)	Subsidized price of electricity (€/kWh)	**Income (€/year)**
Photovoltaic System 20 kW	**30.000**	**0.35**	10.500
Environmental	Emission Reduction factor (kg_{CO2}/kW.year)	Power (kW)	**Emissions saving (kg_{CO2}/ year)**
Photovoltaic System 20 kW	1.183	20	**23.670**
RESULTS – EVALUATION			
Unit Cost (€/$kgCO_2$) ***Photovoltaic System 20 kW***	**2.1 €/ $kg_{CO2\ annual\ saving}$**		**Proposed for implementation** ☒
MEASURE TO IMPLEMENT EE4Renewable electricity in buildings of the Municipality			
Total Cost **50.000 €**	**Profit** **10.500 €**	**Emissions Reduction** **23.670 Kg_{CO2}/ year**	**Repayment /Depreciation** **4.8 years**

7.3 Energy saving campaigns

Measure: ARC 1 – Organization of an annual seminar on Renewable Energy Sources

The organization of an annual seminar on Renewable Energy Sources in Strovolos Municipality was examined. The full-day seminar will be held at the Municipal Hall annually for a total of 3 years.

The application of this measure can be considered to have a high indirect cost as, apart from the organization of the seminar (speakers, invitations, location, catering, etc), the interested party must bear their own costs of implementing renewable energy technologies at home.

Measure Code	**ARC1**	
Measure Name	**Organization of annual seminar on RES**	
APPLICATION COST		
Measure Cost	**3.000 €**	
Indirect Cost	☒ **– High** ☐ **– Medium** ☐ **– Low**	
APPLICATION BENEFIT		
Energy Financial (Green energy. €/year) Environmental ($kgCO_2$-eq)	**270.000 kWh/year** The economic benefit is for those concerned **213.030 kg_{CO2}/year**	
RESULTS – EVALUATION		
Unit Cost (€/$kgCO_2$)	**0.014€/ $kg_{CO2\ annualsaving}$**	**Proposed for Implementation** ☒

Equation: ES=v*ε*n*νδ*ESPP
ES: Energy Saving (kWh) v: participation number ε: Application years n: Awareness Percentage (0-100%) νδ: number of diffuse influence ESPP: Green Energy per person (kWh)
Calculation: ES= 200*3*0.3*3*1000kWh/year= 540.000 kWh/year

Measure ARC2 – Organisation of annual seminar on energy saving

Examined the organization of the annual seminar on energy saving in Latsia Municipality. The seminar will be conducted all day and in the Municipal Hall for 3 years.

The indirect cost of the measure can be considered as high as apart from organizing the seminar (speakers, invitations, space, catering etc), interested parties should bear their own costs of implementing energy saving technologies in their home.

Period of application of the measure: 2012-2014

Measure Code	**ARC2**	
Measure Name	**Organization of annual seminar on energy saving**	
APPLICATION COST		
Measure Cost	**3.000 €**	
Indirect Cost	☐ **– High** ☒ **– Medium** ☐ **– Low**	
APPLICATION BENEFIT		
Energy Financial (Green energy. €/year) Environmental ($kgCO_2$-eq)	**157.500 kWh/year** The economic benefit for those concerned **101.917 kg_{CO2}/year**	
RESULTS – EVALUATION		
Μοναδιαίο Κόστος (€/kg CO_2)	**0.029€/ $kg_{CO2\ annual\ saving}$**	**Προτείνεται για υλοποίηση** ☒

Equation: ES=v*ε*n*νδ*ESPP
ES: Energy Saving (kWh) v: participation number ε: Application years n: Awareness Percentage (0-100%) νδ: number of diffuse influence ESPP: Green Energy per person (kWh)
Calculation: ES= 100*3*0.25*3*700kWh/year= 157.500 kWh/year

Measure: ARC3 – Organizing a day of «Renewable Energy Sources and Energy Saving»

Examined the organization of the annual day of renewable energy and saving the municipality Latsia. The measure will apply for a period of 10 years.

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

Implementation of March 12, 2011 (every year)

Measure Code	**ARC3**	
Measure Name	**Organizing days of Renewable Energy Sources and Energy Saving**	
APPLICATION COST		
Measure Cost	**10.000 €**	
Indirect Cost	☒ **– Hight** ☐ **– Medium** ☐ **– Low**	
APPLICATION BENEFIT		
Energy Financial (Green energy. €/year) Environmental ($kgCO_2$-eq)	**6.144.000 kWh/year** The economic benefit for those concerned **4.734.000 kg_{CO2}/year**	
RESULTS – EVALUATION		
Unit Cost (€/$kgCO_2$)	**0.002€/ $kg_{CO2\ annualsaving}$**	**Proposed for Implementation** ☒

Equation: ES=v*ε*n*vδ*ESPP
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= 640*10*0.4*3*800kWh/year= 6.144.000 kWh/yea

Measure: ARC 4 – 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 six (6) presentations.

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

Years of Implementation: 2010, 2012, 2014, 2016, 2018, 2020

Measure Code	**ARC4**	
Measure Name	**Organization of educational presentations to students**	
APPLICATION COST		
Measure Cost	**3.000 €**	
Indirect Cost	☒ **– High** ☐ **– Medium** ☐ **– Low**	
APPLICATION BENEFIT		
Energy Financial (Green energy. €/year) Environmental ($kgCO_2$-eq)	**1.440.000 kWh/year** The economic benefit for those concerned **931.815 kg_{CO2}/year**	
RESULTS – EVALUATION		
Unit Cost (€/$kgCO_2$)	0.005€/ $kg_{CO2\ annual\ saving}$	**Proposed for Implementation** ☒

Equation: ES=v*ε*n*vδ*ESPP
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*10*0.4*3*600kWh/year= 1.440.000 kWh/year

Measure: ARC 5 – Organization of day without lighting

The organization of an annual day without lighting in Strovolos Municipality was examined. The measure will be effective for a period of 10 years.

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

Implementation 30 March, 2011 (annually)

Measure Code	**ARC5**	
Measure Name	**Organization of days without lighting**	
APPLICATION COST		
Measure Cost	1500 €	
Indirect Cost	☒ **– High Υψηλό** ☐ **– Medium Μέσο** ☐ **– Low Χαμηλό**	
APPLICATION BENEFIT		
Energy Financial (Green energy. €/year) Environmental ($kgCO_2$-eq)	**180.000 kWh/year** The economic benefit for those concerned **116.477 kg_{CO2}/year**	
RESULTS – EVALUATION		
Unit Cost Μοναδιαίο Κόστος (€/$kgCO_2$)	**0.013€/ $kg_{CO2\ annual\ saving}$**	**Proposed for Implementation** ☒

Equation: ES=v*ε*n*νδ*ESPP
ES: Energy Saving (kWh) v: participation number ε: Application years n: Awareness Percentage (0-100%) νδ: number of diffuse influence ESPP: Green Energy per person (kWh)
Calculation: ES= 1500*10*0.05*3*80kWh/year= 180.000 kWh/year

Measure: ARC 6 – Information about energy in the Municipality website and newspaper

The posting of information on RES and ES in the Municipality of Strovolos website was examined. In addition, there will be a special article on energy in the Municipality quarterly newspaper. The measure would have a period of 10 years.

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

Start of Implementation: 2010

Measure Code	**ARC6**	
Measure Name	**Information about energy in the Municipality website and newspaper**	
APPLICATION COST		
Measure Cost	**0 €**	
Indirect Cost	☒ **– High** ☐ **– Medium** ☐ **– Low**	
APPLICATION BENEFIT		
Energy Financial (Green energy. €/year) Environmental ($kgCO_2$-eq)	450.000 kWh/year The economic benefit for those concerned 291.192 kg_{CO2}/year	
RESULTS – EVALUATION		
Unit Cost (€/$kgCO_2$)	Unit Cost (€/$kgCO_2$)	Unit Cost (€/$kgCO_2$)

Equation: ES=v*ε*n*νδ*ESPP
ES: Energy Saving (kWh) v: participation number ε: Application years n: Awareness Percentage (0-100%) νδ: number of diffuse influence ESPP: Green Energy per person (kWh)
Calculation: ES= 2000*10*0.15*3*455kWh/year= 4.500.000 kWh/year

Measure: ARC 7 – Free consulting services from the Municipality to its citizens

The ability to service the citizens with consultancy services by an employee of the Municipality was examined. The measure would have a period of 3 years.

The indirect cost of the measure application can be considered as high as the interested party should bear their own costs of implementing energy saving measures or renewable energy sources at home. It is expected that less people will be interested in this measure compared to participation in other events.

Measure Code	**ARC7**	
Measure Name	**Free consulting services from the Municipality to its citizens**	
APPLICATION COST		
Measure Cost	6000 €	
Indirect costs	☒ **– High** ☐ **– Medium** ☐ **– Low**	
APPLICATION BENEFIT		
Energy Financial (Green energy. €/year) Environmental ($kgCO_2$-eq)	**1.215.000 kWh/year** The economic benefit for those concerned **786.219 kg_{CO2}/year**	
RESULTS – EVALUATION		
Unit Cost (€/$kgCO_2$)	0.008 €/ $kg_{CO2\ annual\ saving}$	Proposed for Implementation ☒

Equation: ES=v*ε*n*νδ*ESPP
ES: Energy Saving (kWh) v: participation number ε: Application years n: Awareness Percentage (0-100%) νδ: number of diffuse influence ESPP: Green Energy per person (kWh)
Calculation: ES= 100*3*0.75*3*1800kWh/year= 1.215.000 kWh/year

Measure: ARC 8 – Organization of Cycling days

Exanimate the possibility of service to citizens with consulting services by an employee of the municipality. The measure would have application until 2020.

Years of 2011 - 2020

The indirect cost of the measure can be regarded as medium as stakeholders (who will sensitize) should bear their own costs of implementing energy saving measures or renewable home. The number of interested will be relatively smaller in relation to its interests in other events.

Measure Code	**ARC8**	
Measure Name	**Organization days of bicycle motion**	
APPLICATION COST		
Measure Cost	6000 €	
Indirect Cost	☒ – High ☐ **– Medium** ☐ – Low	
APPLICATION BENEFIT		
Energy Financial (Green energy. €/year) Environmental ($kgCO_2$-eq)	1.215.000 kWh/year **The economic benefit for those concerned stems from fuel saving** 786.219 kg_{CO2}/year	
RESULTS – EVALUATION		
Unit Cost (€/$kgCO_2$)	Unit Cost (€/$kgCO_2$)	Unit Cost (€/$kgCO_2$)

Equation: ES=v*ε*n*νδ*ESPP
ES: Energy Saving (kWh) v: participation number ε: Application years n: Awareness Percentage (0-100%) νδ: number of diffuse influence ESPP: Green Energy per person (kWh)
Calculation: ES= 100*3*0.75*3*1800kWh/year= 1.215.000 kWh/year

Measure: ARC 9 – Organization of eco-cars days

The organization of an annual day of eco-cars in Latsia Municipality was examined. The measure would apply for 2 years.

The indirect cost of the measure application can be considered as average as, apart from organizing the event; the interested party should bear their own cost of an eco-car purchase.

Start of Implementation: 2012 and 2014

Measure Code	**ARC9**	
Measure Name	**Organization days of eco-cars**	
APPLICATION COST		
Measure Cost	1000 €	
Indirect Cost	☐ **– High** ☒ **– Medium** ☐ – Low	
APPLICATION BENEFIT		
Energy Financial (Green energy. €/year) Environmental ($kgCO_2$-eq)	276.300 kWh/year The economic benefit for those concerned stems from fuel saving 69.793 kg_{CO2}/year	
RESULTS – EVALUATION		
Unit Cost (€/$kgCO_2$)	Unit Cost (€/$kgCO_2$)	Unit Cost (€/$kgCO_2$)

Equation: ES=v*ε*n*vδ*ESPP
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= 100*2*0.05*3*9210kWh/year= 276.300 kWh/year

Measure: ARC 10 – Information and public awareness through leaflets and information messages

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

The indirect cost of the measure application can be considered as high as apart from leaflets preparation and distribution, the interested party (to be aware) should bear their own any investment or savings.

Measure Code	**ARC10**			
Measure Name	**Leaflets and information messages**			
APPLICATION COST				
Measure Cost	Total (€)			
(a) Leafletsfor RES and ES	2000 €			
(b) Leaflets for sustainable mobility	2000 €			
(c) Articles in the newspaper of the Municipality	0 €			
(d) TV Spot	5000 €			
(e) Radio Spot	3000 €			
Indirect Cost				
	☒ **– High** ☐ **– Medium** ☐ **– Low**			
APPLICATION BENEFIT				
Energy	Number/ Recipients	Percentage of awareness	Energy Profit (kWh/person.year)	**Energy Saving (kWh/year)**
(a) Leaflets for RES and ES	**10.000**	**5%**	**1100**	550.000
(b) Leaflets for sustainable mobility	**10.000**	**5%**	**2210**	110.500
(c) Articles in the newspaper of the Municipality	**10.000**	**2%**	**900**	220.000
(d) TV Spot	**4.000**	**4%**	**1100**	176.000
(e) Radio Spot	**4.000**	**3%**	**1000**	120.000
Financial				
	The economic benefit for those concerned stems from energy saving			
Environmetal	**Emissions Saving (kg_{CO2}/ year)**			
(a) Leafletsfor RES and ES	**355.901**			
(b) Leaflets for sustainable mobility	**279.174**			

(c) Articles in the newspaper of the Municipality	**142.361**	
(d) TV Spot	**113.888**	
(e) Radio Spot	**77.651**	
RESULTS – EVALUATION		
Unit Cost (€/kgCO_2)		Proposed for Implementation
(a) Leaflets for RES and ES	0.006 €/ $kg_{CO2\ annual\ saving}$	☒
(b) Leaflets for sustainable mobility	0.007 €/ $kg_{CO2\ annual\ saving}$	☒
(c) Articles in the newspaper of the Municipality	0 €/ $kg_{CO2\ annual\ saving}$	☒
(d) TV Spot	0.044 €/ $kg_{CO2\ annual\ saving}$	☒
(e) Radio Spot	0.039 €/ $kg_{CO2\ annual\ saving}$	☒
MEASURE TO IMPLEMENT IC10 (a,b,c,d,e) Leaflets and infromation messages		
Total Cost **12.000 €**	**Emissions reduction** **968.975 Kg_{CO2}/ year**	

Measure: ARC 11–Organization of annual seminar for energy saving in Industry

The organization of an annual seminar on saving energy in industry in Latsia Municipality was examined. The seminar will be held all day at the Town Hall for 3 years.

The indirect cost of the measure application can be considered as high as apart the seminar organization (speakers, invitations, place, catering, etc), the interested party should bear their own costs of implementing energy saving measures in industry.

Implementation 2013, 2014, 2015

Measure Code	**ARC11**	
Measure Name	**Organization of annual seminar for energy saving in Industry.**	
APPLICATION COST		
Measure Cost	**4.500 €**	
Indirect Cost	☒– **– High** ☐– **Medium** ☐ – Low	
APPLICATION BENEFIT		
Energy Financial (Energy saving. €/year) Environmental(kgCO_2-eq)	**725.625 kWh/year** The economic benefit for those concerned **469.547 kg$_{CO2}$/year**	
RESULTS – EVALUATION		
Unit Cost (€/kg CO_2)	**0.001€/ kg$_{CO2\ annual\ saving}$**	**Proposed for Implementation** ☒

Equation: ES=v*ε*n*νδ*ESPP
ES: Energy Saving (kWh) v: participation number ε: Application years n: Awareness Percentage (0-100%) νδ: number of diffuse influence ESPP: Green Energy per person (kWh)
Calculation : ES= 50*3*0.5*1.5*6450kWh/year= 725.625 kWh/year

7.4 Energy Savings in Transport

Measure: EST 1 – Promotion of eco cars

Examined the possibility of promotion vehicles with low CO2 emissions through the provision of facilities. The two cases examined are (a) free parking, and (b) electric vehicle charging points. The application period is for 4 years.

Years of 2012-2016

The indirect cost of the measure can be considered limited as the parties (which will raise awareness for eco-car market) will have to bear the cost themselves purchase.

Measure Code	**EST1**			
Measure Name	**Promotion of eco cars**			
APPLICATION COST				
Measure Cost	**Total (€)**			
(a) Free parking (20 positions)	**15.000 € *loss of revenue**			
(b) Charging Points of Electric Vehicles (5 positions)	**2500 €**			
Indirect Cost				
	☐ **– High** ☐ **– Medium** ☒ **– Low**			
APPLICATION BENEFIT				
Energy	Number of position	Traffic (4 years)	ES per visit& ES by diffuse information (kWh/ year)	**Energy Saving (kWh/year)**
(a) Free parking (10 positions)	**10**	**14.600**	**70**	1.022.000
(b) Charging Points of Electric Vehicles (5 positions)	**5**	**1825**	**80**	584.000
Financial				
	The economic benefit for those concerned stems from energy saving			
Environmental	**Emissions saving (kg_{CO2}/ year)**			
(a) Free parking (10 positions)	258.157			
(b) Charging Points of Electric Vehicles (5 positions)	147.518			
RESULTS – EVALUATION				
Unit Cost (€/$kgCO_2$)			Proposed for Implementation	
(a) Free parking (10 positions)	0.058 €/ $kg_{CO2\ annual\ saving}$		☒	
(b) Charging Points of Electric Vehicles (5 positions)	0.017 €/ $kg_{CO2\ annual\ saving}$		☒	
MEASURE TO IMPLEMENT ΕΕΠ11 (a,b) Cars promotion with low CO2 emissions				
Total Cost **17.500 €**		**Emissions Reduction** **405.675 Kg_{CO2}/ year**		

Measure: EST2 –Energy saving in the Municipality's fleet

The possibility of purchase five vehicles with low CO_2 emissions was examined.

The indirect cost of the measure application can be considered as limited as the interested party (to be aware of eco-car market) should bear the cost themselves their market.

The indirect, (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 cost of the measure application is not particularly important, as the following requirements must first be fulfilled: (a) preparation of the call for tenders (b) Evaluation of offers against specific technical and financial criteria of low emissions cars which is sponsored by the Scheme of the Ministry of Commerce, Industry and Tourism. 700 € for low emissions vehicle and 1200€ for a hybrid.

Measure Code	**EST2**	
Measure Name	**Energy saving in the Municipality's fleet**	
APPLICATION COST		
Measure Cost	Total(€)	
Purchase of 5 eco cars	45.000 €	
Indirect Cost		
	☐ **– High** ☐ **– Medium** ☒ – Low	
APPLICATION BENEFIT		
Energy	Energy Saving (kWh/year)	
Purchase of 3 eco cars	27.630	
Financial	Saving (€/year)	
Purchase of 3 eco cars	3000	
Environment	Emissions saving (kg_{CO2}/ year)	
Purchase of 3 eco cars	6980	
RESULTS – EVALUATION		
Unit Cost (€/$kgCO_2$)		Προτείνεται για υλοποίηση
Purchase of 5 eco cars	6.45 €/ $kg_{CO2\ annual\ saving}$	☒
MEASURE TO IMPLEMENT EST2 (a,b) Cars promotion with low CO2 emissions		
Total Cost **45.000 €**	**Emissions Reduction** **4.653 Kg_{CO2}/ year**	

Measure: EST3 – Saving energy in transport by promoting bicycle use (bicycle rental system)

The possibility of bicycle promotion by installing bicycle rental system in collaboration with the Municipalities of Nicosia District was examined. The application period is for 10 years starting in 2011.

The indirect cost of the measure application can be considered as limited as the interested party (to be aware of bicycle use) should bear the minimal cost of renting bicycles.

Measure Code	**EST3**			
Measure Name	**Bicycle Sharing System**			
APPLICATION COST				
Measure Cost	Total (€)			
2 positions and 15 bicycles	30.000 €			
Indirect Cost				
	☐ **– High** ☐ **–Medium** ☒ **– Low**			
APPLICATION BENEFIT				
Energy	Number of bicycles	Traffic per year	ES per bicycle& ES by diffused information (kWh/ year)	**Energy Saving (kWh/year)**
2 positions and 15	**15**	**1095**	**40**	657.000
Financial				
	The economic benefit for those concerned stems from fuel saving			
Environmental	**Emissions Saving (kg_{CO2}/ year)**			
2 positions and 15 bicycles	165.958			
RESULTS - -EVALUATION				
Unit Cost (€/$kgCO_2$)			Proposed for Implementation	
2 positions and 15 bicycles	0.18 €/ $kg_{CO2\ annual\ saving}$		☒	
MEASURE TO IMPLEMENT ΕΕΠ11(α),(β) Cars promotion with low CO2 emissions				
Total cost 30.000 €	**Emissions Reduction 165.958 Kg_{CO2}/ year**			

7.5 Energy conservation in street lighting

Measure ESSL1: Energy conservation in street lighting

The possibility of energy saving in street lighting. The street lighting is one of the major expenses of the municipality. The electricity consumption for streetlights Latsia in 2009 was 1.574.000 kWh

The two cases examined are: (a) replacement LED bulbs with economic and (b) optimization study the working hours of street lighting.

Implementation of the measure in 2013

The indirect cost of the measure can be considered small.

Measure Code	**ESSL1**			
Measure title	**Energy conservation in street lighting**			
APPLICATION COST				
Cost of measure	**Total (€)**			
a) Replacement LED lamps	**75.000 €**			
(b) Optimize function street lighting	**5.000 €**			
Indirect Cost				
	☐ **– High** ☐ **– Medium** ☒ **– Low**			
Maintenance cost				
	☐ **– High** ☐ **– Medium** ☒ **– Low**			
APPLICATION BENEFIT				
Energy	**Number**	**Electricity consumption per lamp (kWh / year)**	**Saving per lamp per year (%)**	**Saving per lamp per year (%)**
a) Replacement LED lamps	500	800	50	**200.000**
(b) Optimize function street lighting	500	800	5	**40.000**
Financial	**Energy savings (kWh**	**Average electricity price (€ / kWh)**	**Saving (€/year)**	
a) Replacement LED lamps	200.000	0.13	**26.000**	
(b) Optimize function street lighting	40.000	0.13	**5.200**	
Environmental	**Emission Saving (kg_{CO2}/ year)**			
a) Replacement LED lamps	**174.800**			
(b) Optimize function street lighting	**34.960**			
RESULTS - EVALUATION				
Unit Cost (€/kg CO_2)	**Proposed for implementation**			

a) Replacement LED lamps	**0.429 €/ kg_{CO2} annual saving**	☒
(b) Optimize function street lighting	**0.143 €/ kg_{CO2} annual saving**	☒

MEASURE TO IMPLEMENT EOF1 (a), (b) Energy savings in street lighting			
Total Cost	**Saving**	**Reduce Emissions**	**Repayment**
80.000 €	**31.200 €**	**209.760 Kg_{CO2}/ year**	**2.6 years**

7.6 Investments of Latsia Municipality in RES

Measure RES1: Investment of Municipality in Renewable Electricity

This included the creation of two photovoltaic parks. The indirect cost of the measure is not very significant because it requires (a) the preparation conditions for receipt of tenders (b) tender evaluation by technical and economic criteria, (c) completion form (request) to secure grants from the Grant Scheme 2009-2013 the MCIT. Should also be made the connection process works with the EAC network. Photovoltaics (Parks) a grant to sold kWh (price € 0,31).

Project implementation period: 2014-2016

Measure Code	**RES1**		
Measure Name	**Renewable Electricity by Photovoltaics**		
APPLICATION COST			
Investment cost	Total (€)		
Photovoltaic Park 150 kW	400.000		
Operational cost			
Photovoltaic Park 150 kW	0 € (negligible cost for periodic module cleaning)		
Indirect Cost			
	☐ – High ☒ – Medium ☐ – Low		
APPLICATION BENEFIT			
Energy	Power (kW)	Electricity generation (kWh/kW.year)	**Green Energy (kWh/year)**
Photovoltaic Park 150 kW	**150**	**1500**	225.000
Financial	Green Energy (kWh/year)	Subsidized price of electricity (€/kWh)	**Income (€/year)**
Photovoltaic Park 150 kW	**225.000**	**0.31**	69.750
Environmental	**Emissions Saving** (kg_{CO2}/ year)		
Photovoltaic Park 150 kW	**177.525**		
RESULTS EVALUATION			
Unit Cost (€/kg CO_2)		**Proposed for Implementation**	
Φωτοβολταϊκό πάρκο 150 kW	**2.253 €/ $kg_{CO2\ annual\ saving}$**	☒	
MEASURE TO IMPLEMENT RES1 Renewable Electricity by Photovoltaics			
Total Cost **400.000 €**	**Income** **69.750 €**	**Emissions Reduction** **177.525 Kg_{CO2}/ year**	**Repayment/Depreciation** **5.7 years**

7.7 Development of green areas in Latsia Municipality

Measure DGS1: Development of green spaces in the Municipality

Was Eexamined a) tree planting (b) care of green spaces

The indirect cost of the measure can be considered Limited.

Measure Code	**DGS1**		
Measure Name	**Development of green spaces in Strovolos Municipality**		
APPLICATION COST			
Measure Cost	Total (€)		
(a) Tree Planting (2000 trees)	3000 €		
(b) Care of green spaces	8000 €		
Indirect Cost			
	☐ **– High** ☐ **– Medium** ☒ **– Low ó**		
APPLICATION BENEFIT			
Environmental	Emission Saving (kg_{CO2}/ year)		
(a) Tree Planting (2000 trees)	60.000		
(b) Care of green spaces	30.000		
RESULTS - -EVALUATION			
Unit Cost (€/kg CO_2)			**Proposed for Implementation**
(a) Tree Planting (2000 trees)	**0.05 €/ $kg_{CO2\ annual\ saving}$**		☒
(b) Care of green spaces	**0.26 €/ $kg_{CO2\ annual\ saving}$**		☒
MEASURE TO IMPLEMENT DGS1 Development of green spaces			
Total Cost **11.000 €**		**Emissions Reduction** **90.000 Kg_{CO2}/ year**	

7.8 Summary of proposed measures at Latsia Municipality

Table 34 The Table below demonstrates all the measures proposed to be taken by the Strovolos Municipality and have been included in the Sustainable Energy Action Plan.

Measure / Action	Application	Cost (€)	Emissions Reduction (Kg_{CO2}/ year)	Depreciation /Repayment
Energy Saving in public buildings				
EE 1 - Thermal Interventions in Town Hall	2012	24.000	50.371	2.3 years
EE 1 - Thermal Interventions in Town Hall warehouses	2012	4.500	2.969	6.2 years
EE 3 – Electricity Savings in Town Hall	2012	31.125	19.849	9,5 years
EE 4: Renewable electricity with PV in buildings of the Municipality	2012-2015	50.000	23.670	4,8 years
Energy Saving through awareness raising campaigns				
ARC 1 – Organizing an annual seminar on Renewable Energy Sources	2012-2014	3.000	213.030	-
ARC 2 - Organizing an annual seminar on energy saving	2012-2014	3.000	101.917	-
ARC 3 - Organizing an annual seminar on Renewable Energy Sources and energy saving	2012-2020	10.000	4.734.000	-
ARC 4 – Organization of educational presentations to students	2010-2020	3.000	931.815	-
ARC 5 – Organizing days without lighting	2012-2020	1.500	116.477	-
ARC 6 - Information about energy in the website and newspaper of the Municipality	2010-2020	0	291.192	-
ARC 7 – Free counselling services by the Municipality to its residents	2012-2014	6.000	786.219	-
ARC 8 - Organization bicycle motion days	2011-2020	6.000	786.219	-
ARC 9 – Organization of eco-cars	2012-2014	1000	69.793	-

days				
ARC 10 – Information, Awareness with leaflets ans information messages	2012-2020	12.000	968.975	-
ARC 11 – Organizing an annual seminar on Energy Saving in Industry	2013-2015	4.500	469.547	-
Energy Saving in transport				
EST 1: Saving Energy in transport by promoting eco-friendly cars (hybrid and electrical)	2012-2016	17.500	405.675	-
EST 2: Saving Energy in the Municipality fleet	2016-2020	45.000	4.653	-
EST 3: Saving Energy in transport by promoting bicycle use (bicycle rental system)	2011-2020	30.000	165.958	-
Energy Saving in street lighting				
ESSL 1: Energy saving in street lighting	2013	80.000	209.760	2.6 years
Investments of the Municipality in RES				
RES 1: Investments of the Municipality in Renewable Electricity	2014-2016	400.000	177.525	5.7 years
Development of green spaces in Municipality				
DGS 1: Development of green spaces	2011-2020	11.000	90.000	-
TOTAL		**743.125**	**10.619.614**	

7.9 Contribution of National Measures on Sustainable Energy Action Plan of the Municipality of Latsia

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

Table 35 Total presentation of energy saving from national measures

	NATIONAL MEASURES FOR ENERGY EFFICIENCY	Energy Saving (MWh/year)			
		Residential	Tertiary	Industrial	Transports
1	Legislation on Energy Building Performance (Equation 1)	1.294	1.524	674	0
2	Legislation for the inspection of air conditioning and heating systems (Equation 1)	621	731	324	0
3	Grant Schemes for the installation of solar thermal systems (Equation 1)	217	256	113	0
4	Grant Schemes for the installation of geothermal systems (Equation 1)	155	183	81	0
5	Legislation on energy efficiency of appliances (Equation 1)	922	1.406	701	0
6	Grant Schemes for the installation of Photovoltaics Systems (Equation 2)	390	325	650	0
7	Legislation for mandatory integration of solar water heaters (Equation 1)	115	161	82	0
8	Grant Schemes for thermal insulation of buildings	0	1.524	270	0
9	Grant Schemes for cogeneration in Industry (Equation 1)	0	0	1.538	0
10	Plan of single urban transport system (Equation 3)	0	0	0	26.740
11	Mandatory inspection of Vehicles MOT (Equation 3)	0	0	0	18.163
12	Withdrawal Plan of old vehicles (Equation 3)	0	0	0	4.359
13	Grant Schemes for hybrid vehicles and vehicles with low CO2 emissions (Equation 3)	0	0	0	2.325
14	Discounts on vehicles registration for vehicles with low CO2 emissions (Equation 3)	0	0	0	2.906
	TOTAL PER SECTOR	3.714	6.110	4.433	54.493
	TOTAL	**68.750**			

Table 36 Total presentation of reducing CO2 emissions from national measures

NATIONAL MEASURES FOR ENERGY		Emission Reduction (tCO_2/year)			
		Residential	Tertiary	Industrial	Transport
1	Legislation on Energy Building Performance (Equation 1)	838	1.020	448	0
2	Legislation for the inspection of air conditioning and heating systems (Equation 1) (Σχέση 1)	402	490	215	0
3	Grant Schemes for the installation of solar thermal systems (Equation 1)	141	171	75	0
4	Grant Schemes for the installation of geothermal systems (Equation 1)	101	122	54	0
5	Legislation on energy efficiency of appliances (Equation 1)	596	942	466	0
6	Grant Schemes for the installation of Photovoltaics Systems (Equation 2)	252	218	432	0
7	Legislation for mandatory integration of solar water heaters (Equation 1)	75	108	54	0
8	Legislation on energy efficiency of existing buildings with an area grater than 1000m^2 (Equation 1)	0	1.020	179	0
9	Grant Schemes for cogeneration in Industry (Equation 1)	0	0	1.022	0
10	Plan of single urban transport system (Equation 3)	0	0	0	6.754
11	Mandatory inspection of Vehicles MOT (Equation 3)	0	0	0	4.588
12	Withdrawal Plan of old vehicles (Equation 3)	0	0	0	1.101
13	Grant Schemes for hybrid vehicles and vehicles with low CO2 emissions (Equation 3)	0	0	0	587
14	Discounts on vehicles registration for vehicles with low CO2 emissions (Equation 3)	0	0	0	734
	TOTAL PER SECTION	2.405	4.091	2.945	13.764
	TOTAL	23.205			

Table 37 Equations used for access contribution of the national measures to save energy

(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: Number of participation (0-100%)

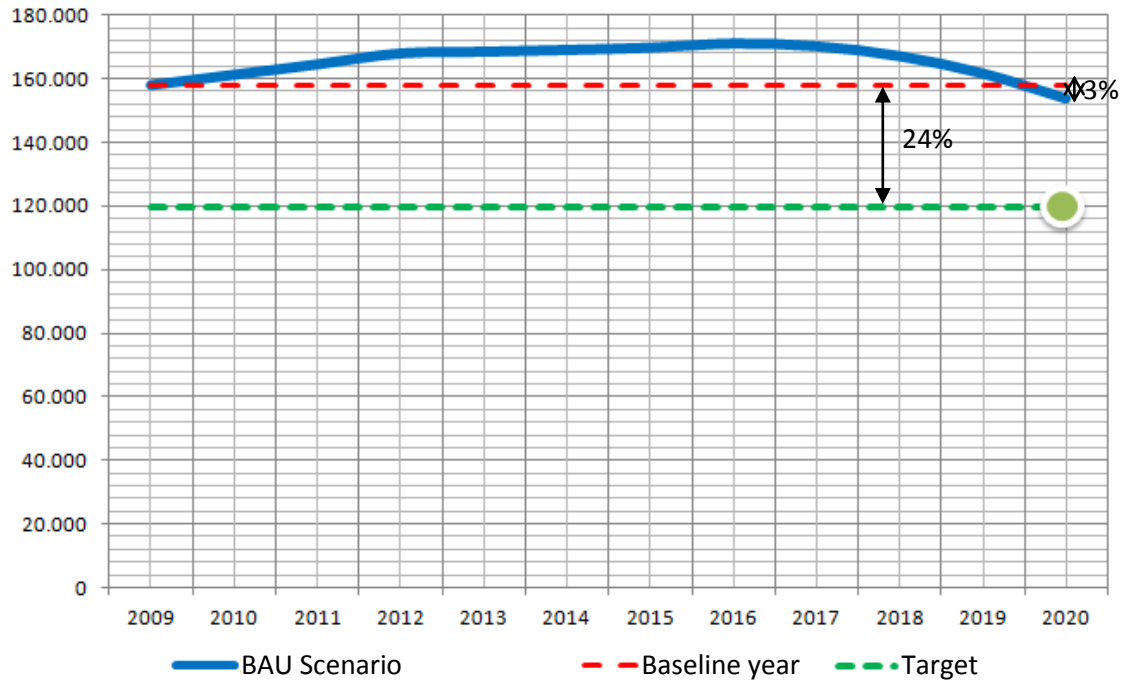
(3) EOS=(N*FO*np)+(ΔO*FO*np)
EOS: Energy Saving from fuel MWh) N: Population FO: Saving Energy per person (MWh) np: Number of participation (0-100%) ΔO: Passing Vehicles

7.10 Description of achieving emission reduction of CO_2 for 2020.

The overall goal of reducing carbon dioxide emissions achieved by implementing the action plan for 2020, is 24% reduction compared to the reference year 2009. Achieving this objective is presented in the table below.

Emission inventory for reference year 2009 (tnCO_2/year)	157.832
Expected emissions for 2020 – Expected Development Scenario (tn CO_2/year)	153.557
Estimated emission reduction from national measures for 2020 (tn CO_2/year)	23.205
Estimated emission reduction by the Municipality for 2020 (tn CO_2/year)	10.620
Total estimated emission reductions for 2020 (tn CO_2/year)	33.825
Estimated emissions for 2020 of the Action (tn CO_2/year)	119.732
Emission reduction percentage by 2020 compared with 2009	**24%**

Picture 30 Schematic of the Expected Evolution Scenario of CO2 emissions in Latsia Municipality and the reduction target for 2020 by 20%



Sources of energy data

- Fuel/heating fuel consumption from oil companies within the administrative limits of Strovolos 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 CO_2 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 Plan for Energy Efficiency 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 from the Electricity Authority of Cyprus [www.eac.com.cy]

- Energy consumption data in municipal buildings from the Municipality of Strovolos.

- 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:
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:

Latsia Municipality
Mayor Panagiwtis Kyprianou
Municipal Secretary Michalis Socratous

Contact:
Latsia Municipality
Gianou Kranidioti Avenue 57
P.C. 2235, Latsia,Cyprus
Tel. +357-22878688
Fax: +357-22487213
Email: latsia@latsia.org.cy
m.socratous@latsia.org.cy
Web: www.latsia.org.cy
Energy Manager
Spyros Makrigiannis
Email: s.makriyiannis@latsia.org.cy

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