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PACT OF ISLANDS

Sustainable Energy Action Plan

PARALIMNI MUNICIPALITY - CYPRUS

15 December 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.

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

Paralimni is a town and municipality of Cyprus, since 1986, in the District of Famagusta in the south east of the island. Located in the Kokkinochoria area and takes its name from the Paralimni lake beside which it is built. It is the largest municipality of the free part of Famagusta. The number of people in the city of Paralimni according to the census of 2001 was 11,100 and in 2009 the city's population is estimated at 13,850.

The Energy Action Plan prepared by the Cyprus Energy Agency and presented to the Municipal Council which was approved on June 14, 2011.

The year 2009 was designated as the year of referencing/recording energy consumption and CO2 emissions in the Municipality's territory. According to actual consumption data collected by the Electricity Authority of Cyprus (utility), the oil companies, the Statistical Service of Cyprus, etc, the total energy consumption in 2009 in Paralimni was 445.904 MWh. The largest consumer of energy in the municipality is transport with 241.296 MWh and followed by the tertiary sector with 117.296 MWh.

The CO2 emissions in 2009 attributable to the overall energy consumption in the municipality are 198.819 tons.

For the forecast of CO2 emissions in the period 2010 to 2020, the scenario of expected evolution was established, where it was estimated that without taking any measures emissions will amount to 193.193 tons.

The Sustainable Energy Action Plan that was prepared for the Municipality includes additional measures / actions to achieve at least the European goal of combating climate change. That is, the measures that will be taken by the Municipality in addition to national measures in order to overcome the goal of reducing CO2 emissions by at least 20% by 2020 with respect to the reference year 2009.

The proposed measures are split into the following categories:

Description	Number
Energy Saving in Municipality public buildings	4
Energy Saving via informational campaigns	12
Energy saving in transport	4
Energy saving in street lighting	1
Municipality investments in renewable energy sources	2
Development of green spaces	1

The estimated annual emissions reduction for 2020 by applying the above measures amounts to 6.406 tons. it was estimated that the impact on Paralimni Municipality from the

implementation of the national measures taken to reduce carbon dioxide emissions will result to an additional decrease of 28.411 tons.

Therefore, with the implementation of the Sustainable Energy Action Plan and a total reduction of 34.817 tons, annual emissions for 2020 will be limited to 158.376 tons. That is, **21%** lower with respect to those in the reference year 2009.

The budget of the Action Plan for the period 2010 to 2020 amounts to €933.500. Funding for the implementation of the Energy Action Plan is expected to be taken from the following resources:

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

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THE ISLEPACT PROJECT

1.1 Introduction

The main objective of the ISLE-PACT project is the development of Local Sustainable Energy Action Plans, aiming at achieving European sustainability objectives as defined by the EU for 2020, namely a reduction of CO2 emissions by at least 20% through measures promoting renewable energy, energy savings and sustainable transport. The duration of the project is set at 30 months, from 1st February 2010 until 31st July 2012.

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

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 the delivery of the final Sustainable Energy Action Plan for evaluation, monitoring and verification of individual goals,
- To organize Energy Days, in collaboration with the European Commission and other stakeholders (e.g. Cyprus Energy Agency), providing an opportunity for citizens to have direct contact with the subject and also to benefit directly from sustainable energy use, as well as informing the local media for individual developments in local action plans,
- Participation in various conferences and workshops organized by various European institutions in connection with the Covenant of Mayors and the Pact of Islands,
- Further implementation of energy investment in the project areas.

1.3 Participating Municipalities and Communities in Cyprus

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

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 Islands 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 Chadjittofis (left) and the Mayor of Aglantzia Andreas Petrou (right)

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

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

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

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

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

Figure 9 The President of Psimolofou Community Ioannis Lazarides

2 Cyprus

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

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

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

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

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

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

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

Year of EU entry:	2004
Political system:	Democracy
Capital:	Nicosia(Lefkosia)
Total area:	9.250 km²
Population:	0,8 million
Currency:	euro

Source: http://europa.eu

3 Paralimni Municipality

3.1 Introduction

Paralimni is a town and municipality of Cyprus, since 1986, in the District of Famagusta in the south east of the island. Located in the Kokkinochoria area and takes its name from the Paralimni lake beside which it is built. It is the largest municipality of the free part of Famagusta.

3.2 History

Prehistoric Period (10.000 – 1000 BC)

The area of Paralimni, featuring many favorable environmental parameters was early on a very attractive site for human settlement and activity. Therefore, one meets, signs of the presence of people in every corner of the land.

The oldest evidence of human presence in Paralimni, or even in Cyprus, are some stone tools detected in the rocky areas of Protaras.



Clearer picture of the permanent inhabitation of people in the region, and for farming activities, we get from the results of the excavations on the Nisia area, where a settlement 7.000 years old was found. The space in the Nisia presents the elements of a dynamic development with intense building activity oriented to address the specific circumstances and needs of the community. Impressive is the volume and quality of movable finds in the settlement Nisia, which indicates that the Neolithic inhabitants were able to successfully solve the pressing problems of survival.



Apart from the Nisia, in the same period in the area of Paralimni there were other communities without specialized production, faced strong the environmental challenges. Such a Neolithic community chose to settle on the steep hill of Prophetis Elias, from which it could supervise safely throughout the surrounding region, but also the community that had been established in the area next to the headless rich streams. Another area with evidence of prehistoric presence is settled in the cave of Agioi Saranta.

Ancient Years (1000 BC – 300 AD)

In ancient times, in the sea area of Paralimni, according to Stravonas, there was one port, the Lefkolla, where researchers of the 19th century found members of statues and inscriptions invoking Apollo. The name of the Lefkola is also connected with a major sea battle of 306 BC between the forces of Antigonus and Ptolemeus,who with hundreds of ships, which some of them sunk in Konnos area, tried to determine the future of Cyprus. In memory of the glorious naval victory of Dimitrius the Besieger, son of Antigonus, is said that the statue of Niki on the prow of the ship bringing the message of success was built.

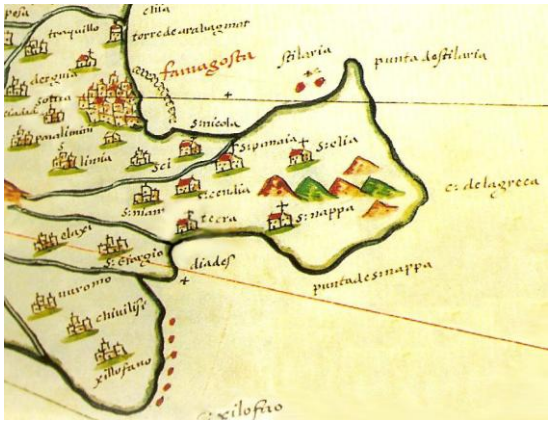
Besides Lefkolla, along the coastline of Paralimni, at the same time, there was an extensive number of settlements in the Mandala, Xistaria, Pyrki and elsewhere. In the middle of the 4th century AD these settlements destroyed by successive strong earthquakes and giant deadly tidal sea waves that occurred in southeastern Cyprus.

Byzantine Period (300 – 1200 AD)

Equally sweeping for the ancient world proved the appearance of Christianity which offered the seductive hope to the people of the place. The first christians in the area of Paralimni made use of caves and catacombs for the manifestation of their religious beliefs, as was the cave carved in Poxama. Also built brilliant, expensive temples as evidenced by marble columns in Vyzakia who proclaimed the triumph of Christianity over the ancient pagan temples.

Another religion, Islam, was destined to be disastrous for the location of Paralimni which was closer to the Arab territories coasts and thus accepted all the fury of the neophyte. The different religion raiders led from the wealth of the island, arrived in the 7th century, forcing the locals to move within or relocate to settlements, obscured by the sea such as in Apissotou and Agios Dimitrianos. Furthermore in the period of the Arab raids which the area is abandoned, the place of Paralimni attracts ascetics on the steep slopes and the deserted beaches. They, in uncertainty and insecurity of the time, sought the peace and salvation of their souls to monasticism, for this reason, took refuge in isolated caves, such as Agioi Saranta and Agios Ioannis.

After the expiration of long-term disaster, kidnappings and decimated of the population and the discharge of area by the scourge of the Arab raids, its inclusion within the flourishing Byzantine Empire in the 10th century temporarily reignited the life. So started to create some new most dynamic settlements, one of which was the Paralimni.

Medieval-New Era (1200 – 1960 AD)

During the next period of Frankish-Venetian, from the 13th to the 16th century, the thriving Paralimni, which even mentioned in documents as a royal village, although absorbed all existing facilities and strengthened regional population, in fact considered by the central government as a place of exile for unwanted officials. At that time rebuilt the temple of the Holy Virgin Mary - Agia Anna, with Byzantine style, proving the doctrinal continuity with the past and a little east erected the church of Profitis Elias.






In addition, built the aqueduct, in Panagia, that provided water to the Famagusta with mechanically excellent underground and aboveground structures, such as the Pente Kamares. Still working on the reconstruction of Famagusta, extensive stone quarries in Perneres and Poxama. Apart from this created a new village, Melissona, to serve the requirements of specialized labor, which will processed rocks to extract huge amounts of building material requiring the fortification works of Famagusta to repel the danger of Ottoman.

At the time when Cyprus was trying to deal with the Ottoman whirlwind and during the 11 months suffocating siege of Famagusta in 1571, camped around the area of Paralimni numerous muslim soldiers who engaged in looting and killing the locals. The population continued to Paralimni decimated due to various natural disasters that arose in the coming years. However, the population in the 19th century, due to an economic recovery, stood at 400 persons who built the ornate church of Agios Georgios at the end of Ottoman rule.

The period of British rule that followed, the British, after intense pressure from the locals went on to a series of beneficial effects such as drill pipes for drainage of unhealthy lake, creating ditches to irrigate the coastal area of Paralimni, improving road network in the region and supporting financial the primary education for school construction.

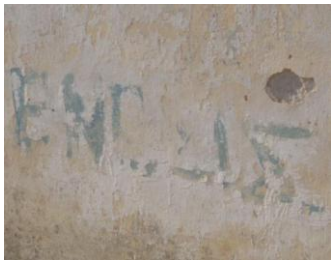
Of course, efforts to improve living conditions in Paralimni, which resulted in economic revitalization and population growth, had as its main objective the creation of appropriate conditions for efficient and profitable exploitation of the potential of the region by the British. But also aims to penetrate the culture and serve the political interests of the colonialists.



For this reason residence of Paralimni decided, after the realization that the colonial Britain looked to satisfy only its own interests, to pursue with resolutions to their right to self-determination. The stated desire of the Paralimni for "Union" with Greece, expressed in successive resolutions in all the years of British occupation and accompanied also by participating in the great struggles of the Greek nation. So many residents of Paralimni were present in the Balkan Wars and also in the First and Second World War, abetted especially by the British, who left to hovers the feeling that Cyprus would benefit from these conflicts.

However, when the residence of Paralimni found that will vindicate their visions, have intensified their efforts in engaging with bloody sacrifices in the national liberation struggle of '55-'59. The massive recruitment of EOKA with residents of Paralimni led to many heroic acts such as ambushes and executions of enemy. Unfortunately, the many acts of self-sacrifice had several times as a result of the arrest and long imprisonment.

With their daring deeds and selfless the residence of Paralimni showed that, apart from reputable poets, who enjoyed the assessment of a Nobel laureate Giorgos Seferis, also was famous warriors, proud patriots, whose contribution to the struggle was recognized by all the people of Cyprus . So, the locals could rightly take credit for the crucial role of Paralimni to the success of the national liberation struggle, although the ardent desire for "Union" with Greece not quenched the thirst of with the establishment of the Republic in 1960.




Modern Era (1960 – 2010)

In the next years, the first freely for Cypriots after centuries of subjugation to foreign conquerors, the residence of Paralimni continued to work hard on their farms that where irrigated, as decades ago, the tirelessly windmills and began to employed in new resorts that made use of the golden beaches.

Moreover, they wanted to fortify the spiritual and religious role of Paralimni erecting schools of all levels of education and rebuilding new magnificent church of Agios Georgios was inaugurated by Archbishop Makarios III.

As industrious, forward-looking and deeply religious people the residence of Paralimni, laid the groundwork for an auspicious and peaceful future, which was overturned when the Turks invaded the island. So the residence of Paralimni asked to resubmit their souls and their blood to protect the country from the Turkish invaders in '74 or even for practical resistance to the ongoing occupation of Cyprus. Painful result of these struggles for national independence and defending the rights of Cyprus are dozens dead and many missing until the brink of the 21st century, who in their sacrifice have been in the pantheon of heroes.



Today Paralimni, although the '74 due of the Turkish invasion, experienced the same tragic socioeconomic data and asked to provide additional shelter to hundreds of displaced Cypriots, enjoys a boom period. Except that it has become the administrative center of the free Famagusta district and headquarters of the reconstituted Diocese of Constantias-Famagusta, transformed into standard residential complex. Throughout the three parishes of Agios Georgios, Agios Demetrius and Agia Barbara, have created important cultural venues and recreation, department stores and modern, world-renowned tourist infrastructure favoring yearly and periodic presence of new residents and visitors. These new inhabitants and visitors live harmoniously with refugees and old residence of Paralimni, set a different course of Paralimni in the history of the third millennium after Christ.





[Source: History of Paralimni – Aggelos D. Smagas]

3.3 Paralimni Local Plan

Introduction

The area of Paralimni Policy Statement coincides with the municipal area of Paralimni. The total land area of the Policy Statement is 4,792 hectares, while according to the 2001 population census, it had a population of 11,091 people. Paralimni is the largest and most populated community of the geographical region of Kokkinochoria.

The Policy Statement of Paralimni is to define and implement the appropriate term planning policy framework that will allow the rational development of Paralimni until 2016, which is defined as the horizon year of this Development Plan.

Basic Provisions

The functional and physical upgrading of the center of Paralimni is achieved by applying specific policies actively planning for this site, and general policies with an indirect positive effect on it, that could work together and collectively to achieve the desired result. Summarizes the key policies of the Policy Statement related to the center of Paralimni are the following:

(i) Traffic policy, mainly to bypass the center of through traffic, traffic management measures and recession, and creating adequate parking.

(ii) Redistribution policy and prioritization of various land uses, with the aim of organizing and harmonizing them with all the elements of space, to avoid mixing of incompatible functions and promoting the role of the center as the operational core of the entire region.

(iii) Policy for the Area Aesthetic Upgrade, which coincides with the designated Central Commercial Area, aimed at physical and reclamation of existing buildings and the harmonious integration of new buildings in the area.

(iv) Policy to enrich and upgrade the Centre with central and specialized uses for the promotion of cultural and other events.

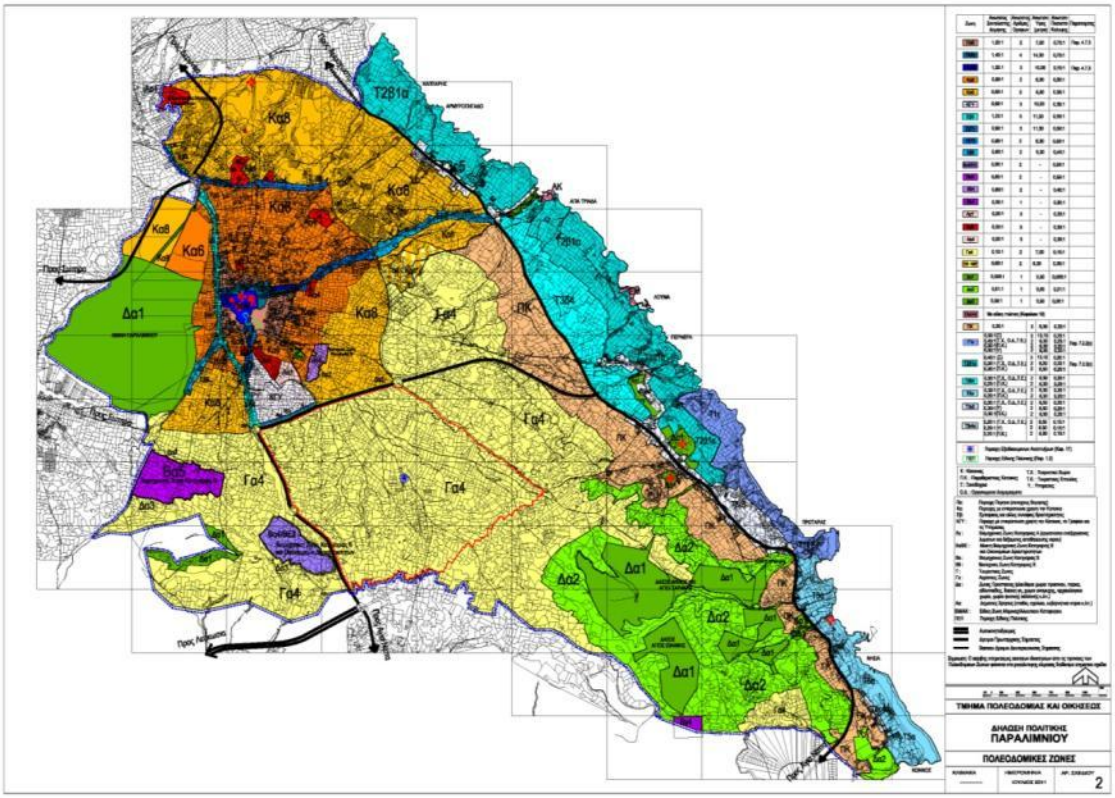


Figure 10 Urban areas of Paralimni [Πηγή: Policy Statement of Paralimni 2011].

Road Network Structure / Hierarchy

The main road network, as shown in the map below, is an essential element for the functional organization of the urban area. This will serve the anticipated traffic and will, where feasible and desirable, the core of the network of public transport and cycling.

Because a significant part of the road network in the area of Paralimni Policy Statement is already designed and / or configured, proposed the completion and the elementary hierarchy in order to obtain a grid main shafts with connector roads and bypasses, allowing better distribution and channeling the burden of movement and facilitate access to various parts of the area of this Declaration. The basic principle of the above design is the use of essential roads and some minor roads essential for bypass of most development area of Paralimni, enabling direct connection of these areas by the sea. Meanwhile, other minor roads will form the frame of the internal road network that serves and connects the various growth areas.

The existing radial mainly road system, derived from the historical development of this suburban complex, is insufficient to meet the rapidly increasing current or projected future traffic needs. For this reason, the road network in the area of this Declaration, adjusted and ranks in streets with prime importance, minor main streets, local roads, cycle paths and footpaths.

To ensure the traffic capacity of roads with prime importance and the conditions of traffic safety along these roads will not be permitted the location deployments of daily service which gather large and continuous movement, such as kiosks, bakeries, lottery ticket, etc

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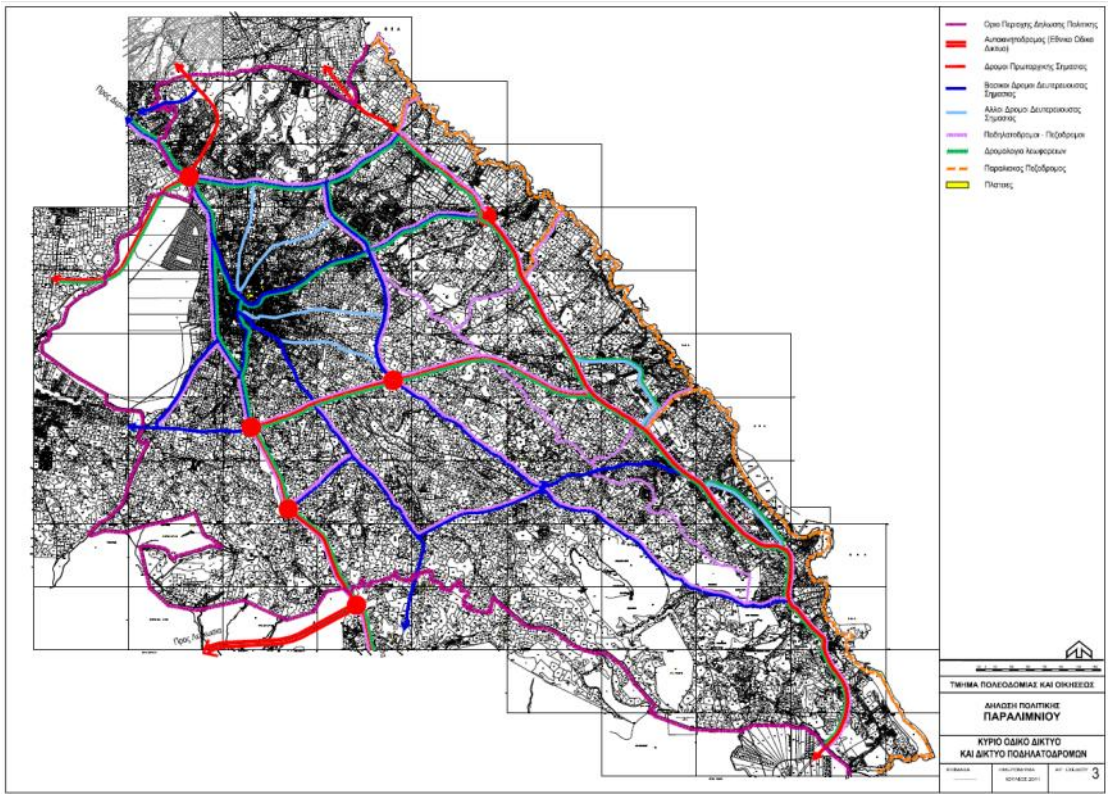


Figure 11 Road Network of Paralimni [Source: Policy Statement of Paralimni 2011]

Traffic Management and Depression

Traffic management measures including restriction of access to main roads, regulate parking along roads, one-way (permanent and temporary), enhancements of existing road contributions, perimeter traffic around the town center, pedestrianizations, bicycle paths construction, etc, fundamentally aimed at facilitating and satisfying of traffic in certain areas without widening roads or other costly construction. The measures of traffic recession applied widely in recent years in many European cities, fundamentally aimed at reducing the speed of vehicles in sensitive residential areas and commercial areas in order to create comfortable and safe conditions for pedestrian and cyclists. The measures include, among other things, to reduce the speed limit and special configurations roads with appropriate areas where priority is the pedestrian and cyclist without completely prohibited the private car.

The main shopping area and the coastal tourist areas are the best places to study and adoption for such measures, which should be studied in greater detail under specific traffic studies or regulatory plans.

Pedestrian Network – Bicycle Paths

Under the Policy Statement of Paralimni considered absolutely necessary and urgent to adopt measures that will encourage the movement of the public with environmentally friendly transport, particularly for small and medium distances. This policy can yield very significant results in the medium term, particularly when targeted at population groups who can use the bike or foot to move with relative ease.

For the transportation needs of pedestrians and cyclists providence the following policy measures:

(a) Methodical and progressive implementation of an integrated and continuous pedestrian and bicycle network that will link the tourism and residential areas with the major activity centers and service institutions, the system of public green space and the beach, and the various reference points with cultural and environmental interest. Particular emphasis will be given to the connection of the center of the settlement with the other growth areas, completion of access to the sea, forming a pedestrian street with plazas along to the biggest part of the coast, as well as the configuration of pedestrian streets or nature trails in the protection areas of Fanos, Agioi Saranda and Agios Ioannis and in the surrounding woodlands.

(b) Expansion of pedestrian zones and creation of additional areas, streets or squares which will be free of motor traffic, especially in the main shopping area and tourist areas.

(c) Promoting such an infrastructure in the design of new or improved growth areas. Particular emphasis will be given to integrated development, including touristic and developments relating with recreation / entertainment.

(d) Ensuring access to areas and points of interest (monuments, beach, etc.), through private development.

(e) Creation of special lanes for bicycles, where feasible, in the framework of implementation projects of primary and secondary roads.

The bicycle paths network, shown on the map, part of which has already built in the framework of implementation of road and urban projects, developed along to the coastal road to serve their respective regions, and extends along to primary and secondary roads. The bicycle paths network, based on the existing and planned distribution of the basic land uses and traffic, environmental and topographical data.

Parking

To deal with the serious problem of parking in the Policy Statement of Paralimni providence the creation of appropriate parking areas, particularly in the region near the main shopping area (CSA) and along the coastal front. The spaces will be created around the CSA will be located at strategic points in the core of the settlement, while in the tourist area are mainly sited close to areas of intense development, as well as in places that are major destinations.

Public Transport

The construction of the primary road network and that of the basic minor roads, especially the parts of the main areas of the Policy Statement of Paralimni is an essential condition for improving the role of public transport. This network will serve the routes of public transport, which must be directly and substantially related to the allocation of uses to maximize the efficiency of its services and upgrading the service of the population.

The support of the public transport system, with emphasis on serving of the regional movement, is a key objective of this Statement. Already in the region operate from private bus company, school bus routes and routes that connect the central area of Paralimni with the coastal areas of this Declaration, and also Deryneia, Agia Napa and Larnaca.

To achieve these broad objectives in the Policy Statement of Paralimni provides that:

(a) Improvement of public transport, with particular emphasis on quality and competitiveness of the service.

(b) Defining of an appropriate and functional paths network to support various services, including buses and small (mini-buses), to connect the coastal areas to the center of Paralimni, especially during the tourist season.

(c) Encouraging the passenger movement to the town center, the main employment areas and schools with buses, with parallel reducing dependency on the private car.

(d) Provide adequate spaces in the central areas of operation stations or stops for agricultural, tourist and school buses.

(e) Reorganization of routes and maps with the right version of routes and schedules.

Natural Environment

The environment is the main capital / legacy of Paralimni area and the importance of ensuring the information is fully recognized and guaranteed through the various provisions of the Policy Statement of Paralimni. Proper management which pursued in the policy statement will ensure sustainable development, recovery identification and competitive advantage over other coastal areas.

Important elements of the natural environment, topographical or geomorphological features, areas with specific characteristics (eg the Lake, the coast, the high hills, areas with specific ecosystems), protected from future development and preserved for the benefit of prosperity of the population and of the visitors.

Important elements of the natural environment in the area of the Policy Statement of Paralimni are: the seasonal lake, the coast, the forest land, areas with specific ecosystems such as marine and coastal area to the location of Konnos, the area Fanos, the hill of Protaras, the hill of Profitis Elias, the forests of Agioi Saranda, the Agios Ioannis and the Agioi Anargiroi as well as the Kokkinogkremmos in continuity with the forest of Agia Napa, and the coastal areas of Agia Triada, Cappari, Luma, Nisia, Protaras and Konnos. These areas will be protected from the effects of any future development and preserved for the benefit of the local population. In cases of project implementation in such areas, which are considered necessary for the orderly functioning of the entire of Paralimni, will consider all necessary measures to mitigate unavoidable impacts on the natural environment and will be through them special protection and management based on dynamic design elements.

Free Green Spaces

In the Policy Statement of Paralimni providence the creation of a system of green open spaces of various scales and types that will serve the development area, will offer a variety of opportunities for entertainment and recreation, and will contribute to the upgrading of the natural environment. This system, in addition to the organization and the facilities offered, aimed at achieving a balance between structured and unstructured surfaces, maintaining and preserving the special characteristics of the site and improve the microclimate of the area, so that it can be a destination for quality tourism.

That system includes a series of free green spaces prioritized as follows:

(a) Regional Park of Fanos: The area of the Regional Park in hilly area of the Fanos includes the forests of Agioi Saranda and Agios Ioannis, extending eastward to the hill of Protaras. To the south, the park integrates functionally with the Forest of Agia Napa. The Regional Park is mainly for environmental walks and other mild recreational activities (biking, riding, etc.), and the planning, protection and management will be promoted by the Ministry of Agriculture, Natural Resources and Environment. In planning, the provision of various small-scale facilities for the guests (parking, pavilion, restrooms, etc.) is taken into account. From

Regional Park passing pedestrian and bicycle paths to connect with the rest of the areas of this Statement, and other neighboring areas and especially with the Agia Napa.

(b) Multifunctional Urban Park: The Multifunctional Urban Park intended to be a multifunctional core (cultural, historical, recreational, social and environmental) with local and supralocal importance, housing a number of major cultural functions and other supportive uses. The Multifunctional Urban Park located in the main shopping area and is within easy access from residential, tourist and other areas across the primary and secondary road network. The final determination of the uses of the park and the further planning, is expected to result from detailed planning of the wider center with the aim of ensuring a particular character and remarkable architecture.

(c) Lake Habitat: Due to the great importance for the local ecosystems required the maintenance and recovery of the habitat of the lake. The lake will be connected to the pedestrian area of the city and through the linear park and the river channel and the rest of Paralimni and the coastal zone. On private properties which adjacent to the lake, the Planning Authority will impose conditions for maintaining the wider environment and building in greater distance than that required under Part C of the "General Provisions Policy."

(d) Kanali Linear Park: A linear strip of land approximately 12.00 meters width along the entire length of the channel drain (length about 7 km) from its source at the lake until the end of the area Konnos presents several perspectives to be converted into a linear environmental park. The park will be based on the Lake and operatively connects the Civil Center with the coastal tourist areas, but also to the hinterland and the Regional Park Fanos. The connection of the Linear Park Kanali to the coastal area, will be achieved using the natural river-line of streams and creeks, which start vertically from the linear path of the channel towards the sea. Due to the linear nature and its proximity to both the center of Paralimni, the tourist area and the major parks, the park is ideal for creating routes for pedestrians and cyclists enjoyment and study of nature.

(e) Parks: These parks are distinguished into three basic categories:

i. Parks in the Residential areas

ii. Agia Marina park

iii. Parks in the touristic areas

(f) Coastal Free spaces: Theses spaces will be along the coast, and include the coastal protection zone and additional areas, expanding in certain strategic areas of the beachfront. Beyond the necessary functional connection to the coastal pedestrian road, some of these areas are expected to provide the necessary outdoor facilities to the public, while at the same time they will help the development of activity points, proposed in the coastal Zone (e.g. areas Louma and Agia Triada).

(g) Riverfront and streams: Riverfronts and streams leading to the lake and sea respectively, are natural runoffs for rain water. Theses will be conserved to be part of the wider network of free spaces of the area. These free spaces will be related to the routes for pedestrians and cyclists.

(h) Private parks outside the Growth areas: These consist of land such as tree cultivations, natural forest or bush areas etc and will be protected from the premature and uncontrolled building development, so as to continue to be elements of natural environment enrichment and part of the network of free spaces of the area.

[Source: Policy Statement of Paralimni 2011]

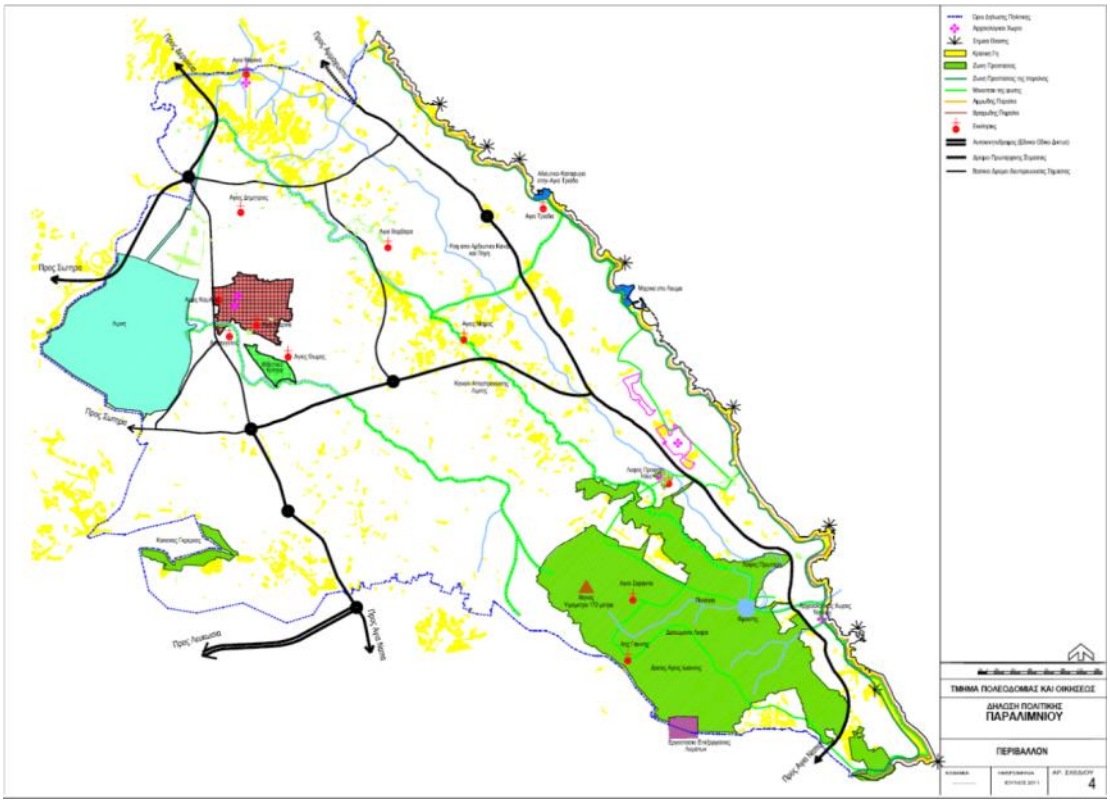


Figure 12 Areas of Environmental Significance in Paralimni [Source: Policy Statement of Paralimni 2011].

4 Current Status at Paralimni Municipality

4.1 Description of the buildings of Paralimni Municipality

The operating hours for all municipal services are 07:30 – 14:00 during the summer period (1 June – 31 August) and for the remaining months the hours are 07:30 – 14:30 and every Wednesday until 18:00.

Table 1 Energy consumptions in the municipal buildings

Energy consumption (kWh)	2010
Town Hall-Theater	137.986
Museum of Folk Art	4.777
Giorkeio kindergarten	22.894
TOTAL	**165.657**

4.2 Public street lighting of Paralimni Municipality

According to data from the EAC, the total energy consumption in 2009 for street lighting was equal to 2.530.000 kWh.

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

Table 2 Paralimni Municipality Lamp Types

LAMP TYPE	LAMP POWER	NUMBER
HPS *	250 W	1082
HPS	150 W	260
HPS	70 W	6175
Compact	21 W	30

* High Pressure Sodium

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

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

4.3 Building permits in Paralimni municipality

In the table below, provided 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 / residences in apartment buildings:

Table 3 Building Permits in the Municipality of Paralimni [Source: Statistical Service of Cyprus]

Issue Authority	2009				2010			
	Number	Area (m^2)	Value	Reside. Units	Number	Area (m^2)	Value	Reside. Units
FAMAGUSTA	**535**	**275.358**	**228.595**	**1.890**	**474**	**198.451**	**170.227**	**1.177**
Paralimni	213	175.835	145.177	1.280	203	101.162	85.234	614
Province Percentage	40%	64%	64%	68%	43%	51%	50%	52%

According to data from the EAC the number of domestic consumers in Paralimni in 2009 was 16,129. This figure is particularly high for a municipality in the size of Paralimni and this is due to the large number of holiday homes in the municipality.

Also in the tertiary sector (services sector) there is a significant number of consumers who are shown in the table below.

Table 4 Number of Commercial Consumers in Paralimni [Source: EAC]

Sector	Number
Wholesale and Retail Trade, repair of motor vehicles and motorcycles	639
Hotels and Restaurants	421
Public Administration and Social Insurance	55
Defense, Justice, Police and Fire stations/departments	8
Education	85
Human Health and Social Care	50
Other Services	1.580

4.3.1 Public Transport

Public transport in the municipality carried out by the Famagusta District Transport Organisation (OSEA), founded in 2009 for the implementation of all public passenger transport in free Famagusta.

Overall of 20 preset bus routes which cover all major areas of the District, 13 of them serve the municipality of Paralimni.

The policy that followed is based on significantly improving the efficiency of the public transport system, which will help to gradually reduce traffic problem and reduce emissions of CO2.

It is also noted that during the summer the routes are more frequent and serve the increased needs due to the seasonal tourism.

Figure 13 Winter Bus Routes Network of Famagusta [Source: www.osea.com.cy]

4.4 Solid waste management and recycling in Paralimni

The collection of solid waste is from the services of the municipality of Paralimni and its disposal becomes at the center of Waste Management in Kosi.

The garbage collection program in the municipality of Paralimni performed by a contractor of the nonprofit organization Green Dot Cyprus since 2009.

- The recycling program that implemented in Paralimni is the system'' door to door'', specific the garbage trucks of the contractor of Green Dot collects recyclable materials out of every house and premise.
- Within the boundaries of the municipality of Paralimni apart from the recycling system'' door to door'', also placed recycling bins, PMD (blue), paper (brown) and glass and collect them every week alongside the houses. The glass containers are picked when fully filled.

Table 5 Collected Quantities of Recyclable in Famagusta [Source: Green dot Cyprus]

Recycling of 2010	tons	Kg/capita
PMD (blue)	650	8.2
PAPER (brown)	1050	16.5
GLASS	1000	13.8
BATTERIES	1	

4.5 Population of Paralimni

Ο αριθμός Δημοτών της πόλης της Παραλιμνίου σύμφωνα με την απογραφή του 2001 ήταν 11.100 και για το 2009 ο πληθυσμός της πόλης υπολογίζεται στις 13.850.

4.6 Green Public Procurement

The Municipality of Paralimni in the invitations for purchase of goods and services promotes green public procurement in fields such as purchasing energy-efficient computers, recycled paper, etc.

4.7 European and International programs

The Municipality of Paralimni participates in the following European projects/ initiatives, some of which are co-funders:

Covenant of Mayors A European Committee initiative for the creation of a permanent collaboration network between European Cities to combat climate change. The municipalities are bound to achieve the European objectives for a reduction of CO2 emissions by at least 20% through measures promoting renewable energy, energy savings and sustainable transport.	Σύμφωνο των Δημάρχων Υπέρ της Τοπικής Βιώσιμης Ενέργειας	www.eumayors.eu
Covenants of Islands ISLE-PACT aims at developing Sustainable Energy Action Plans in Islands, in order to achieve the European objectives set for 2020, to a reduction of CO2 emissions by at least 20%	ISLEPACT SUSTAINABLE ENERGY ACTIONS FOR ISLANDS	www.islepact.eu

5 Inventory of Energy Consumption in Paralimni Municipality

5.1 Residential Sector

Table 6 Energy Demand in MWh in the Residential Sector in 2009

Description	Electricity	Fuel Oil	LPG	Solar	Geothermal	Biomass	Total
Hot water	1.292	1.131	81	5.249	40	283	**8.076**
Heating and cooling	31.011	18.498	1.176	163	109	2.720	**54.678**
Lighting	1.723	-	-				**1.723**
Kitchen	1.292	-	554				**1.846**
Electrical appliances	7.753	-	-				**7.753**
Total	**43.071**	**19.628**	**2.811**	**5.412**	**149**	**3.003**	**74.075**

5.2 Primary sector

Table 7 Energy Demand in MWh in the Primary Sector in 2009

Description	Electricity	Fuel Oil	Diesel	LPG	Biomass	Wind	Total
Agriculture, Forestry and Fishery	2.007	301	-	172	803	240	**3.523**
Minning and Quarring	-	-	-	-	-	-	-
Total	**2.007**	**301**	**-**	**172**	**803**	**240**	**3.523**

5.3 Secondary sector

Table 8 Energy Demand in MWh in the Secondary Sector in 2009

Description	Electricity	Fuel Oil	LPG	Solar	Biomass	Total
Manufacturing	2.724	409	234	120	40	**3.527**
Water supply, wastewater treatment, waste management	3.785	568	325	-	-	**4.678**
Construction	655	98	56	-	-	**809**
Total	**7.164**	**1.075**	**614**	**120**	**40**	**9.014**

5.4 Tertiary sector

Table 9 Final Energy Consumption in MWh in the Tertiary Sector in 2009

Description	Electricity	Fuel Oil	LPG	Solar	Biomass	Total
Wholesale and retail trade, repair of motor vehicles and	15.918	2.390	1.365	682	227	**20.582**

motorcycles						
Hotels and Restaurants	56.712	8.514	4.862	2.431	810	**73.328**
Public administration and social insurance	1.087	163	93	47	16	**1.405**
Defense, Justice, Police, and Fire stations/departments	139	21	12	6	2	**180**
Education	1.222	183	105	52	17	**1.580**
Human Health and Social Care	5.938	891	509	254	85	**7.678**
Other services	8.285	1.244	710	355	118	**10.712**
Public lighting	2.530	-	-	-	-	**2.530**
Total	**91.831**	**13.406**	**7.656**	**3.827**	**1.276**	**117.996**

5.5 Transport

Table 10 Final Energy Consumption in MWh in the Transport in 2009

Description	Electricity	Diesel	Gasoline	Biomass	Total
Urban and suburban passenger transport	29	2.063	2.668	95	**4.854**
Other passenger transportation services (taxi, tourism, school, buses, etc.)	-	33.007	42.684	1.514	**77.205**
Commercial ground transportation services and removable services	-	0	0	0	**0**
Private vehicles	-	68.078	88.036	3.122	**159.236**
Total	**29**	**103.148**	**133.388**	**4.731**	**241.296**

5.6 Total Final Energy Consumption in the Municipality of Paralimni

Table 11 Final Energy Consumption in MWh in 2009

Sector	Electricity	Fuel Oil	Diesel	Gasoline	LPG	Solar	Wind	Geothermal	Biomass	Total
Residential	43.071	19.628	-	-	2.811	5.412	-	149	3003	**74.075**
Primary	2.007	301	-	-	172	-	240	-	803	**3.523**
Secondary	7.164	1.075	-	-	614	120	-	-	40	**9.014**
Tertiary	91.831	13.406	-	-	7.656	3.827	-	-	1.276	**117.996**
Transport	29	-	103.148	133.388	-	-	-	-	4.731	**241.296**
Total	**144.102**	**34.410**	**103.148**	**133.388**	**11.253**	**9.359**	**240**	**149**	**9.853**	**445.904**

Figure 14 Share of Final Energy Consumption by Sectro in 2009

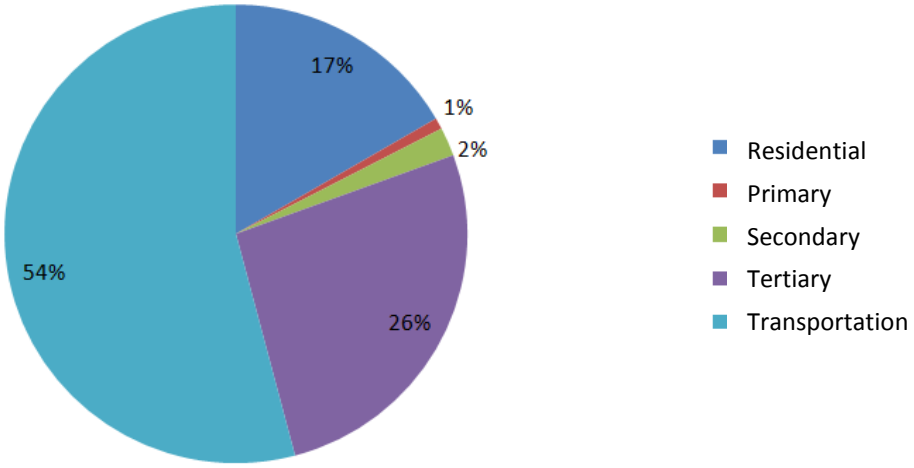
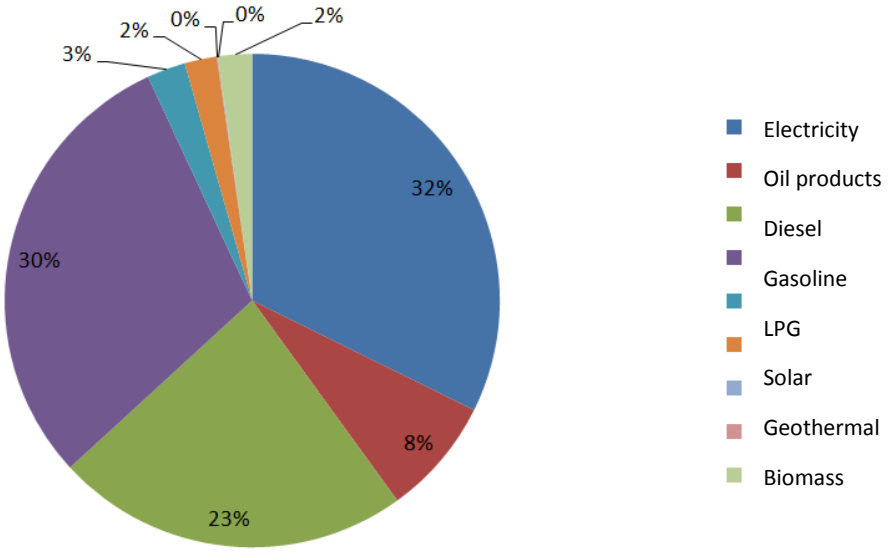


Figure 15 Share of Final Energy Consumption by Energy Source in 2009



6 Inventory of CO_2 emissions at Paralimni Municipality

6.1 Introduction

Carbon dioxide emissions were calculated using standard emission factors on consumption based on the energy source and use. According to these factors Renewable Energy Sources (RES) are considered to have zero carbon emissions.

Table 12 Coefficients for calculating CO_2 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 13 CO_2 emissions in tons in the Residential Sector of Paralimni Municipality in 2009

Description	Electricity	Fuel Oil	LPG	Solar	Geothermal	Biomass	Total
Hot water	1.129	315	19	-	-	-	**1.464**
Heating and cooling	27.104	5.161	522	-	-	-	**32.787**
Lighting	1.506	-	-	-	-	-	**1.506**
Kitchen	1.129	-	133	-	-	-	**1.262**
Electrical appliances	6.779	-	-	-	-	-	**6.776**
Total	**37.644**	**5.476**	**675**	**-**	**-**	**-**	**43.795**

6.3 Primary sector

Table 14 CO_2 emissions in tons in the Primary Sector of Paralimni Municipality in 2009

Description	Electricity	Fuel Oil	Diesel	LPG	Biomass	Total
Agriculture, Forestry and Fishery	1.754	84	-	41	-	**1.879**
Minning and Quarring	-	-	-	-	-	**-**
Total	**1.754**	**84**	**-**	**41**	**-**	**1.879**

6.4 Secondary sector

Table 15 CO_2 emissions in tons in the Secondary Sector of Paralimni Municipality in 2009

Description	Electricity	Fuel Oil	LPG	Solar	Biomass	Total
Manufacturing	2.381	114	56	-	-	**2.551**
Water supply, wastewater treatment, waste management	3.308	159	78	-	-	**3.554**
Construction	572	27	13	-	-	**613**
Total	**6.261**	**300**	**147**	**-**	**-**	**6.709**

6.5 Tertiary Sector

Table 16 CO_2 emissions in tons in the Tertiary sector of Paralimni Municipality in 2009

Description	Electricity	Fuel Oil	LPG	Solar	Biomass	Total
Wholesale and retail trade, repair of motor vehicles and motorcycles	13.912	667	328	-	-	**14.907**
Hotels and restaurants	49.566	2.375	1.167	-	-	**53.108**
Public administration and social insurance	950	46	22	-	-	**1.018**
Defense, Justice, Police and Fire stations/departements	121	6	3	-	-	**130**
Education	1.068	51	25	-	-	**1.144**
Human Health and Social Care	5.190	249	122	-	-	**5.561**
Other services	7.241	347	170	-	-	**7.759**
Public lighting	2.211	-	-	-	-	**2.211**
Total	**80.260**	**3.740**	**1.837**	**-**	**-**	**85.838**

6.6 Transport

Table 17 CO_2 emissions in tons in the Transport of Paralimni Municipality in 2009

Description	Electricity	Diesel	Gasoline	Biomass	Total
Urban and suburban passenger transport	25	551	66	-	**1.240**
Other passenger transportation services (taxi, tourism, school, buses, etc.)	-	8.813	10.268	-	**19.441**
Commercial ground transportation services and mobile services	-	-	-	-	**-**
Private vehicles	-	18.177	21.921	-	**40.098**
Total	**-25**	**27.541**	**33.214**	**-**	**60.779**

6.7 Total CO_2 emissions in Paralimni Municipality

Table 18 CO_2 emissions in tons of Paralimni Municipality in 2009

Sector	Electricity	Fuel Oil	Diesel	Gasoline	LPG	Solar	Geothermal	Biomass	Total
Residential	37.644	5.476	-	-	675	-	-	-	**43.795**
Primary	1.574	84	-	-	41	-	-	-	**1.699**
Secondary	6.261	300	-	-	147	-	-	-	**6.708**
Tertiary	80.260	3.740	-	-	1.837	-	-	-	**85.837**
Transport	25	-	27.541	33.214		-	-	-	**60.780**
Total	**125.764**	**9.600**	**27.541**	**33.214**	**2.700**	-	-	-	**198.819**

Figure 16 Share of CO_2 emissions by sector in Paralimni Municipality in 2009

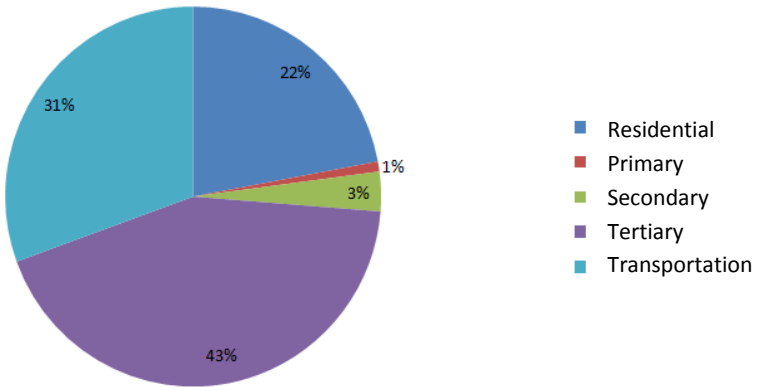
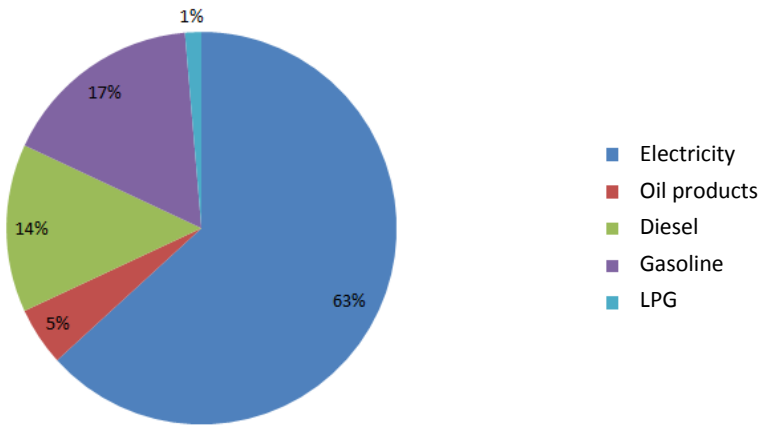


Figure 17 Share of CO_2 emissions by Energy Source in Paralimni Municipality in 2009



6.8 Forecasting scenario of CO_2 emissions

For the forecasting/projection of CO2 emissions in the period 2010 to 2020, a scenario of expected evolution was compiled, which includes the following main assumptions:

1. Use of annual growth rates of energy consumption per sector based on the statistics available during the preparation of the Energy Action Plan (see Table 19).
2. Use of annual growth rates of energy efficiency at the end-use due to the improvement of existing technologies (see Table 20).
3. Estimation of the coefficient of performance of Cyprus Power Plants in subsequent, years, taking into account the technology improvement and the modernization of the existing equipment (see Table 21).
4. The gradual introduction, use and integration of natural gas into the power generating system.

Table 19 Growth Rates of Energy Consumption per consumer used in the expected evolution scenario

Sector Description	Estimate annual energy consumption rate
Residential	
Hot water	2%
Heating and cooling	2%
Lighting	2%
Cooking	2%
Refrigerators and freezers	2%
Washing and dry machines	2%
Dishwashers	2%
Televisions	2%
Other electrical appliances	2%
Primary Sector	
Agriculture, Forestry and Fishery	2.5%
Minning and Quarring	0,0%
Secondary Sector	
Manufacturing	2,5%
Water supply, waste water treatment, waste management and remediation activities	0%
Construction	0%
Tertiary Sector	
Wholesale and retail trade, repair of motor vehicles and motorcycles	3%
Accommodation and food services	3%
General public administration and social insurance	1%
Defense and justice services, police and fire stations/departments	2%
Education	2,5%

Activities related to human health and social care	2%
Other services	2,5%
Municipal/Public lighting	2%
Transport (vehicles)	
Private transport	2%
Urban and suburban passenger transport	2%
Other road transport services (taxi, tourism, school buses, etc.)	0%
Freight road transports and removal services	2,5%
Secondary energy production	
Solar energy for electricity generation	3,0%
Wind energy for electricity generation	1,0%
Solar energy for heating and cooling	2,0%
Geothermal energy for heating and cooling	2,0%

Table 20 Increased Efficiency in Energy End-use (Reducing the Final Energy for the same Useful Energy)

Sector Description	Estimated annual energy consumption rate
Residential	
Hot water	0,5%
Heating and cooling	0,5%
Lighting	0,5%
Cooking	0,5%
Refrigerators and heaters	0,5%
Washing and drying machines	0,5%
Dishwashers	0,5%
Televisions	0,5%
Other electrical appliances	0,5%
Other services	0,5%
Municipal/ Public lighting	0,5%
Transport (vehicles)	
Private transport	0,5%

Table 21 Coefficients of Energy Performance of Electricity Generation

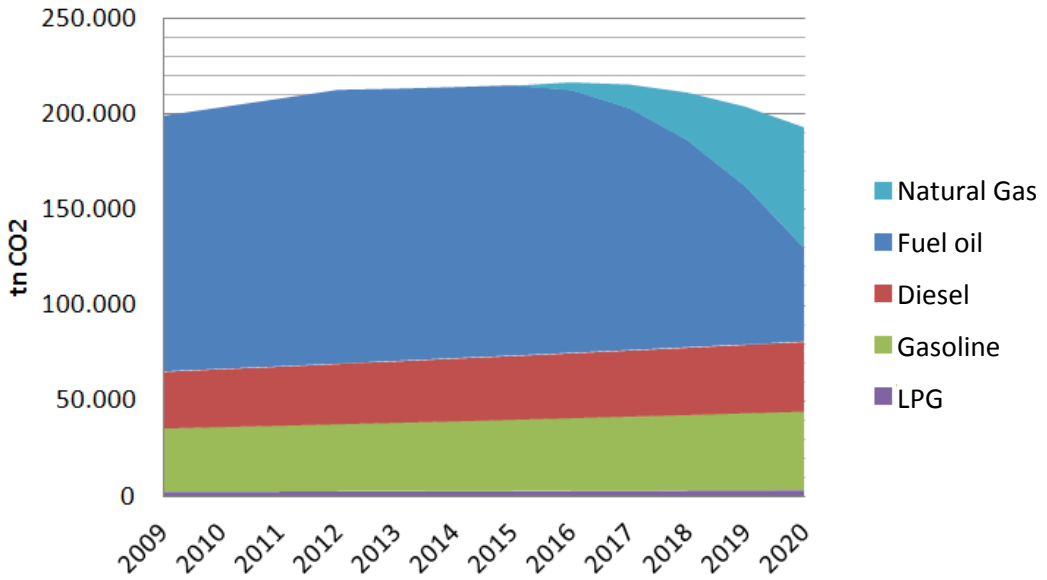
	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Fuel Oil	32%	32%	32%	33%	34%	35%	35%	35%	35%	35%	35%
Diesel	25%	25%	25%	25%	25%	26%	27%	28%	29%	30%	31%
Natural Gas	-	-	-	-	-	43%	43%	43%	44%	44%	44%

Table 22 Expected Evolution Scenario for Forecasting CO2 Emissions for the Period 2009 - 2020

Year	Fuel Oil	Diesel	Gasoline	LPG	Natural	Total	Percentage

					Gas		increase based on 2009
2009	133.392	29.695	33.214	2.701	0	**199.001**	**0%**
2010	136.472	30.293	33.875	2.766	0	**203.406**	**-2%**
2011	139.631	30.904	34.550	2.832	0	**207.918**	**-4%**
2012	142.872	31.528	35.238	2.901	0	**212.539**	**-7%**
2013	142.085	32.164	35.940	2.971	0	**213.160**	**-7%**
2014	141.438	32.813	36.656	3.043	0	**213.950**	**-8%**
2015	141.007	33.381	37.386	3.117	0	**214.890**	**-8%**
2016	137.237	33.964	38.130	3.193	4.149	**216.674**	**-9%**
2017	126.312	34.564	38.890	3.271	12.489	**215.526**	**-8%**
2018	108.060	35.180	39.664	3.352	25.061	**211.317**	**-6%**
2019	82.305	35.811	40.454	3.434	41.912	**203.917**	**-2%**
2020	48.867	36.459	41.260	3.519	63.089	**193.193**	**3%**

Figure 18 Expected Evolution Scenario for Forecasting CO2 Emissions for the Period 2009 -2020



7 Paralimni Municipality Sustainable Energy Action Plan from 2011 to 2020

7.1 Introduction

The Sustainable Energy Action Plan that has been prepared for Agios Athanasios Municipality includes additional measures/actions so as to achieve at least the European goal of combating climate change. This includes measures taken by the Municipality, in addition to national measures, to overcome the goal of reducing CO_2 emissions by at least 20% by 2020 compared to the reference year 2009.

Emissions Reference Year 2009 (tn CO_2/year)	Expected annual emissions in 2020 (tn CO_2/year)	Emissions target 2020 (tn CO_2/year)	Desired minimum (20%) emissions reduction (tn CO_2/year)
199.001	193.193	159.201	33.992

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

The measures are divided in the following main areas:

- Energy saving in public buildings
- Energy saving through awareness raising campaigns
- Energy saving in transports
- Energy saving in street lighting
- Investments in Renewable Energy Sources (RES)
- Development of green spaces

7.2 Energy Saving in Public Buildings

Measure ENEF 1 – Thermal Insulation of the Town Hall

The indirect cost of the application of this measure is not particularly important, as the following requirements must first be fulfilled: (a) preparation of terms for receiving tenders, (b) evaluation of the offers by technical and financial criteria.

Implemented period 2012-2015.

Measure code	**ENEF1**		
Measure name	**Thermal insulation of the Town Hall**		
APPLICATION COST			
Investment cost	**Total cost**		
Insulation Interventions	**16.000**		
Operation cost			
Insulation Interventions	**0 €**		
Indirect cost			
	☐ **– High** ☐ **– Average** ☒ **– Low**		
APPLICATION BENEFITS			
Energy	**Energy Saving (kWh/year)**		
	30.000		
Financial	Energy Saving (kWh/year)	Average electricity and fuel oil price (€/kWh)	**Saving (€/year)**
	30.000	0.18	**5.400**
Environmental	**Emissions Saving (kg_{CO2}/ year)**		
	16.000		
RESULTS – EVALUATION			
Estimated Unit Cost (€/kg CO_2)	**1 €/ $kg_{CO2\ annual\ saving}$**	**Proposed for Implementation** ☒	
DELIVERABLE			
Estimated Total Cost 16.000 €	**Saving 5.400 €**	**Emissions Reduction 16.000 Kg_{CO2}/ year**	**Depreciation 3 years**

Measure ENEF2: Energy Saving in the Town Hall

The indirect cost of the application of this measure is not particularly important, as the following requirements must first be fulfilled: (a) preparation of terms for receiving tenders, (b) evaluation of the offers by technical and financial criteria.

Implemented period 2013.

Measure Code	**ENEF2**			
Measure Name	**Energy saving in the Town Hall**			
APPLICATION COST				
Investment cost	**Cost (€)**			
(a) Voltage corrector	**20.000**			
(b) Bulbs replacing	**1.125**			
Operation cost				
(a) Voltage corrector	**0 €**			
(b) Bulbs replacing	**0 €**			
Indirect cost				
	☐ **– High** ☐ **– Average** ☒ **– Low**			
APPLICATION BENEFITS				
Energy	**Energy Saving (kWh/year)**			
(a) Voltage corrector	**9.000**			
(b) Bulbs replacing	**3.000**			
Financial	Energy saving (kWh/year)	Average electricity price (€/kWh)	**Saving (€/year)**	
(a) Voltage corrector	9.000	0.18	**1.620**	
(b) Bulbs replacing	3.000	0.18	**540**	
Environmental	**Emissions Saving (kg_{CO2}/ year)**			
(a) Voltage corrector	**7.000**			
(b) Bulbs replacing	**2.000**			
RESULTS – EVALUATION				
Estimated Unit Cost (€/kg CO_2) ***(a) Voltage corrector*** ***(b) Bulbs replacing***	 **2,85 €/ $kg_{CO2\ annual\ saving}$** **0,56 €/ $kg_{CO2\ annual\ saving}$**		**Proposed for Implementation** ☒ ☒	
DELIVERABLE				
Total Cost 21.125 €	**Saving 2.160 €**	**Emissions Reduction 9.000 Kg_{CO2}/ year**	**Depreciation 10 years**	

Measure ENEF3: Maintenance of air conditioning systems

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

Measure implementation period: 2012 - 2020

Measure Code	**ENEF 3**		
Code Name	**Maintenance of air conditioning systems**		
APPLICATION COST			
Investment Cost	**Cost (€)**		
Maintenance of air conditioning systems	**0**		
Operation Cost			
Maintenance of air conditioning systems	**1000 €/year**		
Indirect Cost			
	☐ **– High** ☐ **– Average** ☒ **– Low**		
APPLICATION BENEFITS			
Energy	**Energy Saving (kWh/year)**		
	7.000		
Financial	Energy Saving (kWh/year)	Average electricity price (€/kWh)	**Saving (€/year)**
	7.000	0.18	**1.260**
Environmental	**Emissions Saving (kg_{CO2}/ year)**		
	6.118		
RESULTS - EVALUATION			
Estimated unit cost (€/kg CO_2)	**0,16 €/ $kg_{CO2\ annual\ saving}$**	**Proposed for Implementation** ☒	
DELIVERABLE			
Estimated Cost **1000 €**	**Saving** **1.260 €**	**Emissions Reduction** **6.118 Kg_{CO2}/ year**	**Depreciation** **0,8 years**

Measure ENEF4: Renewable Electricity from Photovoltaic Systems on Municipal Buildings

The installation of electricity generating systems with Photovoltaic panels was studied. The total power from the PV installation will be 20 kW and will cover an area of approximately 200 m2.

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

Measure implementation period 2014

Measure Code	**ENEF 4**		
Measure Name	**Renewable Electricity on Municipal Buildings**		
APPLICATION COST			
Investment Cost	**Total (€)**		
Photovoltaic Systems 20 kW	**50.000**		
Operation Cost			
Photovoltaic System 20 kW	**0 € (negligible cost for the periodical cleaning of the frames)**		
Indirect Cost			
	☐ **– High** ☒ **– Average** ☐ **– Low**		
APPLICATION BENEFITS			
Energy	Power (kW)	Electricity Generation (kWh/kW.year)	**Green Energy (kWh/year)**
Photovoltaic Systems 20 kW	20	1500	**30.000**
Financial	Green Energy (kWh/year)	Subsidized price of electricity (€/kWh)	**Income (€/year)**
Photovoltaic Systems 20 kW	30.000	0.35	**10.500**
Environmental	Emission Reduction Factor (kg_{CO2}/kW.year)	Power (kW)	**Emissions Saving (kg_{CO2}/ year)**
Photovoltaic Systems 20 kW	1.183	20	**23.660**
RESULTS - EVALUATION			
Unitary Cost (€/kg CO_2) ***Photovoltaic Systems 20 kW***	**2.1 €/ $kg_{CO2\ annual\ saving}$**		**Proposed for Implementation** ☒
DELIVERABLE			
Total Cost **50.000 €**	**Income** **10.500 €**	**Emissions Reduction** **23.660 Kg_{CO2}/ year**	**Depreciation** **4.8 years**

7.3 Energy Saving through awareness raising campaigns

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

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

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

Measure implementation period: 2012 - 2014

Measure Code	**ESAC 1**	
Measure Name	Organization of an annual seminar on Renewable Energy Sources	
APPLICATION COST		
Cost of Measure	**3.000 €**	
Indirect Cost	☒ **– High** ☐ **– Average** ☐ **– Low**	
APPLICATION BENEFITS		
Energy Financial (Green Energy €/year) Environmental (kg CO_2-eq)	**270.000 kWh/year** The financial benefits for interested parties **213.030 kg_{CO2}/year**	
RESULTS - EVALUATION		
Unitary Cost (€/kg CO_2)	**0.014€/ $kg_{CO2\ annual\ saving}$**	**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= 100*3*0.3*3*1000kWh/year= 270.000 kWh/year

Measure ESAC2: Organization of annual seminar on Energy Saving

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

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

Measure implementation period: 2012 - 2014

Measure Code	**ESAC 2**	
Measure Name	**Organization of annual seminar on Energy Saving**	
APPLICATION COST		
Cost of Measure	**3.000 €**	
Indirect Cost	☐ **– High** ☒ **– Average** ☐ **– Low**	
APPLICATION BENEFITS		
Energy Financial (Energy saving. €/year) Environmental (kg CO_2-eq)	**157.500 kWh/year** The financial benefits for interested parties **101.917 kg_{CO2}/year**	
RESULTS - EVALUATION		
Unitary Cost (€/kg CO_2)	**0.029€/ $kg_{CO2\ annual\ saving}$**	**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= 100*3*0.25*3*700kWh/year= 157.500 kWh/year

Measure ESAC3: Organization of "Renewable Energy Sources (RES) and Energy Saving (ES)" Day

The organization of an annual day of Renewable Energy Sources and Energy Saving in Paralimni Municipality was examined. The measure will apply for a period of 10 years.

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

Implementation on 12 March 2012 (and every following year for 10 years)

Measure Code	**ESAC 3**	
Measure Name	**Organization of "Renewable Energy Sources (RES) and Energy Saving (ES)" Day**	
APPLICATION COST		
Cost of Measure	**10.000 €**	
Indirect Cost	☒ **– High** ☐ **– Average** ☐ **– Low**	
APPLICATION BENEFITS		
Energy Financial (Energy saving. €/year) Environmental (kg CO_2-eq)	**720.000 kWh/year** The financial benefits for interested parties **465.907 kg_{CO2}/year**	
RESULTS - EVALUATION		
Unitary Cost (€/kg CO_2)	**0.02€/ $kg_{CO2\ annual\ saving}$**	**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*0.2*3*600kWh/year= 720.000 kWh/year

Measure ESAC4: Organization of educational presentations to students

Εξετάστηκε η διοργάνωση εκπαιδευτικών παρουσιάσεων σε μαθητές με θέμα τις ανανεώσιμες πηγές ενέργειας και την εξοικονόμηση ενέργειας. Το μέτρο περιλαμβάνει στο σύνολο τους 6 παρουσιάσεις.

Το έμμεσο κόστος εφαρμογής του μέτρου μπορεί να θεωρηθεί ως υψηλό καθώς πέραν από τη διοργάνωση των παρουσιάσεων, οι ενδιαφερόμενοι που θα ευαισθητοποιηθούν (από τα παιδιά τους) θα πρέπει να επιβαρυνθούν οι ίδιοι το κόστος εφαρμογής μέτρων εξοικονόμησης ενέργειας ή ανανεώσιμων πηγών στο σπίτι τους.

Περίοδος Υλοποίησης 2010-2020

Measure Code	**ESAC 4**	
Measure Name	**Organization of educational presentations to students**	
APPLICATION COST		
Cost of Measure	**3.000 €**	
Indirect Cost	☒ **– High** ☐ **– Average** ☐ **– Low**	
APPLICATION BENEFITS		
Energy Financial (Energy saving. €/year) Environmental (kg CO_2-eq)	**1.440.000 kWh/year** The financial benefits for interested parties **931.815 kg_{CO2}/year**	
RESULTS - EVALUATION		
Unitary Cost (€/kg CO_2)	**0.005€/ $kg_{CO2\ annual\ saving}$**	**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= 200*10*0.4*3*600kWh/year= 1.440.000 kWh/year

Measure ESAC5: Organization of "Day without lighting"

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

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

Implementation on 30 March 2012 (and every following year for 10 years)

Measure Code	**ESAC 5**	
Measure Name	**Organization of "Day without lighting"**	
APPLICATION COST		
Cost of Measure	**1.500 €**	
Indirect Cost	☒ **– High** ☐ **– Average** ☐ **– Low**	
APPLICATION BENEFITS		
Energy Financial (Energy saving. €/year) Environmental (kg CO_2-eq)	**180.000 kWh/year** The financial benefits for interested parties **116.477 kg_{CO2}/year**	
RESULTS - EVALUATION		
Unitary Cost (€/kg CO_2)	**0.013€/ $kg_{CO2\ annual\ saving}$**	**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= 1500*10*0.05*3*80kWh/year= 180.000 kWh/year

Measure ESAC6: Energy Information in the Municipality website and newspaper

The posting of information on Renewable Energy Sources (RES) and Energy Saving (ES) in the Municipality of Paralimni website was examined. In addition, there will be a special article on energy in the Municipality quarterly newspaper. The measure will apply for a period of 10 years.

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

Start of Implementation: 2010

Measure Code	**ESAC 6**	
Measure Name	**Energy Information in the Municipality website and newspaper**	
APPLICATION COST		
Cost of Measure	**0 €**	
Indirect Cost	☒ **– High** ☐ **– Average** ☐ **– Low**	
APPLICATION BENEFITS		
Energy Financial (Energy saving. €/year) Environmental (kg CO_2-eq)	**450.000 kWh/year** The financial benefits for interested parties **291.192 kg_{CO2}/year**	
RESULTS - EVALUATION		
Unitary Cost (€/kg CO_2)	**0.00 €/ $kg_{CO2\ annual\ saving}$**	**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*0.15*3*500kWh/year= 450.000 kWh/year

Measure ESAC7: Free consulting services to the citizens from Municipal Officers

The possibility of providing free consulting services to the citizens from Municipal Officers was examined. The measure will apply for 3 years.

The indirect cost of the measure application can be considered as high as the interested party should bear the costs of implementing energy saving measures or renewable energy sources at home, on their own. The number of people interested in this service will be relatively smaller than the number of participations in other events.

Start of Implementation: 2012

Measure Code	**ESAC 7**	
Measure Name	**Free consulting services to the citizens from Municipal Officers**	
APPLICATION COST		
Cost of Measure	**6.000 €**	
Indirect Cost	☒ **– High** ☐ **– Average** ☐ **– Low**	
APPLICATION BENEFITS		
Energy Financial (Energy saving. €/year) Environmental (kg CO_2-eq)	**1.215.000 kWh/year** The financial benefits for interested parties **786.219 kg_{CO2}/year**	
RESULTS - EVALUATION		
Unitary Cost (€/kg CO_2)	**0.008 €/ $kg_{CO2\ annual\ saving}$**	**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= 100*3*0.75*3*1800kWh/year= 1.215.000 kWh/year

Measure ESAC8: Organization of "Cycling Day"

The organization of an annual "Cycling Day" in Paralimni Municipality was examined. The measure will apply for 10 years.

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

Start of Implementation: September 2012

Measure Code	**ESAC 8**	
Measure Name	**Organization of "Cycling Day"**	
APPLICATION COST		
Cost of Measure	**2000 €**	
Indirect Cost	☐ **– High** ☐ **– Average** ☒ **– Low**	
APPLICATION BENEFITS		
Energy Financial (Energy saving. €/year) Environmental (kg CO_2-eq)	**552.600 kWh/year** The financial benefits for interested parties in terms of fuel saving **357.584 kg_{CO2}/year**	
RESULTS - EVALUATION		
Unitary Cost (€/kg CO_2)	**0.006€/ $kg_{CO2\ annual\ saving}$**	**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= 100*10*0.2*3*921kWh/year= 552.600 kWh/year

Measure ESAC9: Organization of "Eco-cars Day"

The organization of "Eco-cars Day" in Paralimni Municipality was examined. The measure will be held annually for 9 consecutive years.

The indirect application cost of the measure 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: June 2012

Measure Code	**ESAC 9**	
Measure Name	**Organization of "Eco-cars Day"**	
APPLICATION COST		
Cost of Measure	**1000 €**	
Indirect Cost	☐ **– High** ☒ **– Average** ☐ **– Low**	
APPLICATION BENEFITS		
Energy Financial (Energy saving. €/year) Environmental (kg CO_2-eq)	**276.300 kWh/year** The financial benefits for interested parties in terms of fuel saving **69.793 kg_{CO2}/year**	
RESULTS - EVALUATION		
Unitary Cost (€/kg CO_2)	**0.014€/ $kg_{CO2\ annual\ saving}$**	**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= 100*2*0.05*3*9210kWh/year= 276.300 kWh/year

Measure ESAC10: Informational leaflets and messages

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

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

Measure Implementation Period: June 2012-2020

Measure Code	**ESAC 10**			
Measure Name	**Informational leaflets and messages**			
APPLICATION COST				
Κόστος μέτρου	**Total (€)**			
(a) Leaflets on RES and ES	**2.000 €**			
(b) Leaflets on sustainable mobility	**2.000 €**			
(c)Articles in the Municipality's Newspaper	**0 €**			
(d) TV Spots	**5000 €**			
(e) Radio Spots	**3000 €**			
Indirect Cost				
	☒ **– High** ☐ **– Average** ☐ **– Low**			
APPLICATION BENEFITS				
Energy	Number/ receivers	Awareness Percentage	Energy Benefit (kWh/person.year)	**Energy Saving (kWh/year)**
(a) Leaflets on RES and ES	10.000	5%	1100	**550.000**
(b) Leaflets on sustainable mobility	10.000	5%	2210	**110.500**
(c)Articles in the Municipality's Newspaper	10.000	2%	900	**220.000**
(d) TV Spots	4.000	4%	1100	**176.000**
(e) Radio Spots	4.000	3%	1000	**120.000**
Financial				
	The financial benefits for interested parties in terms of energy saving			
Environmental	**Emissions Saving (kg_{CO2}/ year)**			
(a) Leaflets on RES and ES	355.901			
(b) Leaflets on sustainable mobility	279.174			
(c)Articles in the Municipality's Newspaper	142.361			
(d) TV Spots	113.888			
(e) Radio Spots	77.651			

RESULTS - EVALUATION		
Unitary Cost (€/kg CO_2)		**Proposed for Implementation**
(a) Leaflets on RES and ES	**0.006 €/ $kg_{CO2\ annual\ saving}$**	☒
(b) Leaflets on sustainable mobility	**0.007 €/ $kg_{CO2\ annual\ saving}$**	☒
(c)Articles in the Municipality's Newspaper	**0 €/ $kg_{CO2\ annual\ saving}$**	☒
(d) TV Spots	**0.044 €/ $kg_{CO2\ annual\ saving}$**	☒
(e) Radio Spots	**0.039 €/ $kg_{CO2\ annual\ saving}$**	☒
DELIVERABLE		
Total Cost **12.000 €**		**Emission Reduction** **968.975 Kg_{CO2}/ year**

Measure ESAC11: Organization of an annual seminar on "Energy Saving in Industry"

Organization of an annual seminar on "Energy Saving in Industry" in Paralimni Municipality was examined. The all-day seminar will be held in the Town Hall for 3 consecutive years.

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

Measure Implementation Period:2012-2014

Measure Code	**ESAC 11**	
Measure Name	**Organization of an annual seminar on "Energy Saving in Industry"**	
APPLICATION COST		
Cost of Measure	**3.000 €**	
Indirect Cost	☐ **– High** ☒ **– Average** ☐ **– Low**	
APPLICATION BENEFITS		
Energy Financial (Energy saving. €/year) Environmental (kg CO_2)-eq)	**157.500 kWh/year** The financial benefits for interested parties **101.917 kg_{CO2}/year**	
RESULTS - EVALUATION		
Unitary Cost (€/kg CO_2)	**0.003€/ $kg_{CO2\ annual\ saving}$**	**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 industry (kWh)
Calculation: ES= 100*3*0.25*3*700kWh/year= 157.500 kWh/year

Measure ESAC12: Free distribution of energy-saving equipment in the households of the municipality

Examined the distribution of free energy saving equipment (stand by killers) to citizens which will contribute to saving energy consumed by appliances that remain in standby mode.

The indirect cost of the measure can be considered as low as residents can obtain free equipment (a device) from the municipality and subject to successful implementation can buy their own devices. The municipality may grant to its residents these devices based on the following criteria:

A) Economic Criteria
B) Participation in tender Municipality
C) Distinction from participation in the contest of the Municipality
Measure Implementation Period:2014

Measure Cost	**ESAC12**		
Measure Name	**Free distribution of energy-saving equipment in the households of the municipality**		
APPLICATION COST			
Cost of measure	**Total (€)**		
(a) Distribution of 1000 saving devices	**20.000 €**		
Indirect Cost			
	☐ **– – High** ☐ **– Average** ☒ **– Low**		
APPLICATION BENEFITS			
Energy	Number / Recipients	Energy Benefit (kWh/άτομο.year)	**Energy Saving (kWh/year)**
(α) Distribution of 1000 saving devices	1.000	585	**585.000**
Financial			
	The financial benefits for interested parties from ES		
Environmental	**Emissions saving (kg_{CO2}/ year)**		
(α) Distribution of 1000 saving devices	379.000		
RESULTS - EVALUATION			
Unitary Cost (€/kg CO_2)		**Proposed for implementation**	
(α) Distribution of 1000 saving devices	**0.05 €/ $kg_{CO2\ annual\ saving}$**	☒	
DELIVERABLE			
Total Cost **20.000 €**	**Emissions Reduction** **379.000 Kg_{CO2}/ year**		

7.4 Energy Saving in Transport

Measure EST1: Promotion of vehicles with low CO_2 emissions

The possibility of the promotion of vehicles with low CO_2 emissions by providing facilities was examined. Two cases were examined: (a) free parking space and (b) charging points for electric vehicles. The facilities should be provided for 5 years.

The indirect application cost of this measure can be considered low since interested parties would bear the cost of purchasing an eco-car on their own.

Measure Implementation Period: June 2011 – 2015

Measure Code	**EST1**			
Measure Name	**Promotion of vehicles with low CO_2 emissions**			
APPLICATION COST				
Cost of Measure	**Total (€)**			
(a) Free Parking Spaces (10 spaces)	**15.000 € * loss of income**			
(b) Charging points for electric vehicles (5 points)	**2.500 €**			
Indirect Cost				
	☐ **– High** ☐ **– Average** ☒ **– Low**			
APPLICATION BENEFITS				
Energy	Number of spaces	Traffic (5 years)	ES per visit + ES from diffuse information (kWh/ year)	**Energy Saving (kWh/year)**
(a) Free Parking Spaces (10 spaces)	10	14.600	70	**1.022.000**
(b) Charging points for electric vehicles (5 points)	5	1825	80	**584.000**
Financial				
	The financial benefits for interested parties from ES			
Environmental	**Emissions saving (kg_{CO2}/ year)**			
(a) Free Parking Spaces (10 spaces)	**258.157**			
(b) Charging points for electric vehicles (5 points)	**147.518**			
RESULTS - EVALUATION				
Unitary Cost (€/kg CO_2)			**Proposed for Implementation**	
(a) Free Parking Spaces (20 spaces)	**0.054 €/ kg_{CO2} annual saving**		☒	
(b) Charging points for electric vehicles (5 points)	**0.017 €/ kg_{CO2} annual saving**		☒	
DELIVERABLE				
Total Cost **17.500 €**		**Emissions Reduction** **405.675 Kg_{CO2}/ year**		

Measure EST2: Energy saving in the Municipality's fleet

The possibility of purchasing to vehicles with low CO_2 was examined.

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

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

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

Measure Implementation Period: 2016-2018-2020

Measure Cost	**EST 2**	
Measure Name	**Energy saving in the Municipality's fleet**	
APPLICATION COST		
Cost of measure	**Total (€)**	
Purchase of 3 eco-cars	**45.000 €**	
Indirect Cost		
	☐ **– High** ☐ **– Average** ☒ **– Low**	
APPLICATION BENEFITS		
Energy	**Energy Saving (kWh/year)**	
Purchase of 3 eco-cars	**27.630**	
Financial	**Saving (€/year)**	
Purchase of 3 eco-cars	**3.000**	
Environmental	**Emissions saving (kg_{CO2}/ year)**	
Purchase of 3 eco-cars	**6.980**	
RESULTS - EVALUATION		
Unitary Cost (€/kg CO_2)		**Proposed for implementation**
Purchase of 3 eco-cars	**6.45 €/ $kg_{CO2\ annual\ saving}$**	☒
DELIVERABLE		
Total Cost **45.000 €**	**Emissions Reduction** **4.653 Kg_{CO2}/ year**	

Measure EST3: Energy saving in transports by promoting the use of bicycles (Bicycle Rental System)

The possibility of promoting bicycle use by installing a bicycle rental system was examined. The bicycle rental system will be in cooperation with municipalities in Famagusta or other private (touristic) companies. The application period is for 8 years starting in 2012.

The indirect application cost of the measure can be considered low as interested parties (to be aware of bicycle use) would have to bear the minimal cost of bicycle rental.

Start of Implementation: 2014

bicycle rental system will be in cooperation with municipalities in Famagusta or other private (touristic) companies. The application period is for 8 years starting in 2012.

Measure Code	**EST 3**			
Measure Name	**Bicycle Rental Systems**			
APPLICATION COST				
Cost of measure	**Total (€)**			
2 spaces and 15 bicycles	**30.000 €**			
Indirect Cost				
	☐ **– High** ☐ **– Average** ☒ **– Low**			
APPLICATION BENEFITS				
Energy	Number of Bicycles	Traffic per yeas	ES per bicycle + ES from diffuse information (kWh/ year)	**Energy Saving (kWh/year)**
2 spaces and 15 bicycles	15	1095	40	**657.000**
Financial				
	The financial benefits for interested parties from fuel saving			
Environmental	**Emissions saving (kg_{CO2}/ year)**			
2 spaces and 15 bicycles	**165.958**			
RESULTS - EVALUATION				
Unitary Cost (€/kg CO_2)			**Proposed for implementation**	
2 spaces and 15 bicycles	**0.18 €/ $kg_{CO2\ annual\ saving}$**		☒	
DELIVERABLE				
Total Cost 30.000 €	**Emissions Reduction 165.958 Kg_{CO2}/ year**			

Measure EST4: Energy Saving in Transport by Upgrading the Cycle Path Network in Paralimni

The upgrade of the cycle path network in Paralimni aiming to promote bicycle use was examined.

The indirect application costs is considered low.

Start of Implementation: 2014 (for 6 years)

Measure Code	**EST 4**			
Measure Name	**Upgrade of Cycle Path Network**			
APPLICATION COST				
Cost of measure	**Total (€)**			
Upgrade of Cycle Path Network	**100.000 €**			
Indirect Cost				
	☐ **– High** ☐ **– Average** ☒ **– Low**			
APPLICATION BENEFITS				
Energy	New Cycle Paths (km)	Traffic per Year (Number of routes)	ES per Km + ES from diffuse information (kWh/ year)	**Energy Saving (kWh/year)**
Upgrade of Cycle Path Network	10	10.000	20	**2.000.000**
Financial				
	The financial benefits for interested parties from fuel saving			
Financial	**Emissions Saving (kg_{CO2}/ year)**			
Upgrade of Cycle Path Network	**472.000**			
RESULTS - EVALUATION				
Unitary Cost (€/kg CO_2)			**Proposed for implementation**	
Upgrade of Cycle Path Network	**0.21 €/ $kg_{CO2\ annual\ saving}$**		☒	
DELIVERABLE				
Total Cost **100.000 €**	**Emissions Reduction** **472.000 Kg_{CO2}/ year**			

7.5 Energy Saving in Street Lighting

Measure ESSL1: Energy Saving in Street Lighting

The possibility of energy saving in street lighting was examined. Street lighting is one of the major expenses of the Municipality. The electricity consumption for street lighting in Paralimni Municipality in 2009 was 2.604.000 kWh.

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

The indirect application cost can be considered low.

Year of Measure Implementation: 2013

Measure Code	**ESSL 1**			
Measure Name	**Energy Saving in Street Lighting**			
APPLICATION COST				
Cost of measure	**Total (€)**			
(a) Replacement of current lamps with economic LED lamps	**80.000 €**			
(b) Optimization of Street Lighting operation hours	**5.000 €**			
Indirect Cost				
	☐ **– High** ☐ **– Average** ☒ **– Low**			
Maintenance Cost				
	☐ **– High** ☐ **– Average** ☒ **– Low**			
APPLICATION BENEFITS				
Energy	Number	Electricity consumption per lamp (kWh/year)	ES per lamp per year (%)	**Energy Saving (kWh/year)**
(a) Replacement of current lamps with economic LED lamps	500	800	60	**240.000**
(b) Optimization of Street Lighting operation hours	500	(800	5	**40.000**
Financial	Energy Saving (kWh/year)	Average Electricity Price (€/kWh)	**Saving (€/year)**	
(a) Replacement of current lamps with economic LED lamps	240.000	0.18	**43.200**	
(b) Optimization of Street Lighting operation hours	40.000	0.18	**7.200**	
Environmental	**Emissions Saving (kg_{CO2}/ year)**			
(a) Replacement of current lamps with	**189.360**			

economic LED lamps		
(b) Optimization of Street Lighting operation hours	**31.560**	
RESULTS - EVALUATION		
Unitary Cost (€/kg CO_2)		**Proposed for implementation**
(a) Replacement of current lamps with economic LED lamps	**0.42 €/ $kg_{CO2\ annual\ saving}$**	☒
(b) Optimization of Street Lighting operation hours	**0.158 €/ $kg_{CO2\ annual\ saving}$**	☒
DELIVERABLE		

Total Cost	**Saving**	**Emissions Reduction**	**Depreciation**
85.000 €	**50.400 €**	**220.920 Kg_{CO2}/ year**	**1,7 years**

7.6 Investments of Paralimni Municipality in RES

Measure RES1: Renewable Electricity with Photovoltaic Systems

The creation of two Photovoltaic Parks was examined.

The indirect application cost is not particularly important as the following requirements must first be fulfilled: (a) preparation of the call for tenders (b) Evaluation of offers by specific technical and financial criteria (c) completion of form (application) to ensure the subsidy from the 2009-2013 Grant Schemes of the Ministry of Commerce, Industry and Tourism. Additionally, the process of connecting the Photovoltaic Parks with the electricity network grid of EAC should be performed. Photovoltaic Systems (Parks) receive a subsidy on the sold kWh (selling price is €0,31)

Measure Implementation Period: 2014-2016

Measure Code	**RES 1**		
Measure Name	**Renewable Electricity with Photovoltaic Systems**		
APPLICATION COST			
Investment Cost	**Total (€)**		
Photovoltaic Park 150 kW	**450.000**		
Operational Cost			
Photovoltaic Park 150 kW	**0 € (negligible cost for the periodical cleaning of the frames)**		
Indirect Cost			
	☐ **– High** ☒ **– Average** ☐ **– Low**		
APPLICATION BENEFITS			
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			
Unitary Cost (€/kg CO_2)		**Proposed for Implementation**	
Photovoltaic Park 150 kW	**2.535 €/ $kg_{CO2\ annual\ saving}$**	☒	
DELIVERABLE			
Total Cost 450.000 €	**Income 69.750 €**	**Emission Reduction 177.525 Kg_{CO2}/ year**	**Depreciation 6.4 years**

Measure RES2: Renewable Electricity with Wind Turbines

The installation of three small wind turbines of 10kW power was examined.

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

Measure Implementation Period: 2015

Small wind turbines receive a grant of 55% of the cost of the Grant Scheme 2009-2013 of MCIT.

Measure Code	**RES2**		
Measure Name	**Renewable Electricity with Wind Turbines**		
APPLICATION COST			
Investment Cost	**Total (€)**		
3 small wind turbines 10 KW (without sponsorship)	**40.000**		
Operational Cost			
3 small wind turbines 10 KW	**750 € for maintaining per year**		
Indirect Cost			
	☐ **– High** ☒ **– Average** ☐ **– Low**		
APPLICATION BENEFITS			
Energy	Power (kW)	Electricity Generation (kWh/kW.year)	**Green Energy (kWh/year)**
3 small wind turbines 10 KW	30	3.900	**39.000**
Financial	Green Energy (kWh/year)	Subsidized price of electricity (€/kWh)	**Income (€/year)**
3 small wind turbines 10 KW	39.000	0.18	**7.020**
Environmental	**Εξοικονόμηση Εκπομπών (kg_{CO2}/ year)**		
3 small wind turbines 10 KW	**30.771**		
RESULTS - EVALUATION			
Unitary Cost (€/kg CO_2)		**Proposed for Implementation**	
3 small wind turbines 10 KW	**1.30 €/ $kg_{CO2\ annual\ saving}$**	☒	
DELIVERABLE			
Total Cost 40.000 €	**Income 7.020 €**	**Emission Reduction 30.771 Kg_{CO2}/ year**	**Depreciation 6.3 years**

7.7 Development of Green Spaces in Paralimni Municipality

Measure DGS1: Development of green spaces

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

The indirect application cost can be considered low.

Measure Code	**DGS 1**	
Measure Name	**Development of green spaces in Paralimni Municipality**	
APPLICATION COST		
Cost of measure	**Total (€)**	
(a) Planting of trees (2000 trees)	**3000 €**	
(b) Care of Green Spaces	**8000 €**	
Indirect Cost		
	☐ **– High** ☐ **– Average** ☒ **– Low**	
APPLICATION BENEFITS		
Environmental	**Emissions Saving (kg_{CO2}/ year)**	
(a) Planting of trees	**60.000**	
(b) Care of Green Spaces	**30.000**	
RESULTS - EVALUATION		
Unitary Cost (€/kg CO_2)		**Proposed for Implementation**
(a) Planting of trees	**0.05 €/ $kg_{CO2\ annual\ saving}$**	☒
(b) Care of Green Spaces	**0.26 €/ $kg_{CO2\ annual\ saving}$**	☒
DELIVERABLE		
Total Cost **11.000 €**	**Emission Reduction** **90.000 Kg_{CO2}/ year**	

7.8 Summary of Measures of Paralimni Municipality

Table 23 Brief Presentation of Measures Taken by Paralimni Municipality and Included in the Sustainable Energy Action Plan

Measure/ Action	Application	Cost (€)	Emissions Reduction (Kg_{CO2}/ year)	Depreciation (years)
Energy Saving in Public Buildings				
ENEF 1: Insulation Interventions	2012-2015	16.000	16.000	3 years
ENEF 2: Energy Saving in the Town Hall	2013	20.000	9.000	10 years
ENEF3: Maintenance of Air Conditioning Systems	2012-2020	1.000	6.118	0,8 years
ENEF4: Renewable Electricity from Photovoltaic Systems on Municipal Buildings	2014	50.000	23.660	4,8 years
Energy Saving through Awareness Raising Campaigns				
ESAC1: Organization of an annual seminar on Renewable Energy Sources	2012-2014	3.000	213.030	-
ESAC2: Organization of an annual seminar on Energy Saving	2012-2014	3.000	101.917	-
ESAC3: Organization of "Reneable Energy Sources (RES) and Energy Saving (ES)" Day	2012-2020	10.000	465.907	-
ESAC4: Organization of educational presentations to students	2010-2020	3.000	931.815	-
ESAC5: Organization of "Day without lighting"	2012-2020	5.000	116.477	-
ESAC6: Information about energy in the Municipality website and newspaper	2010-2020	0	291.192	-
EKEN7: Free consulting services to citizens from Municipal Officers	2012-2020	6.000	786.219	-
ESAC8: Organization of "Cycling Day"	2012-2020	2.000	357.584	-
ESAC9: Organization of "Eco-Cars	2012-2020	1.000	69.793	-

Day"				
ESAC10: Raising awareness through informational leaflets and messages	2012-2020	12.000	968.975	-
ESAC11: Organization of an annual seminar on Energy Saving in Industries	2013-2015	3.000	101.917	-
ESAC12: Free distribution of energy-saving equipment in the households of the municipality	2014	20.000	379.000	
Energy Saving in Transports				
EST1: Energy saving in transports by promoting eco-cars (hybrid and electric)	2011-2015	17.500	405.675	-
EST2: Energy saving in the Municipality's fleet	2016-2020	45.000	4.653	-
EST3: Energy saving in transports by promoting the use of bicycles (Bicycle Rental System)	2014-2020	30.000	165.958	-
EST4: Energy Saving in Transport by Upgrading the Cycle Path Network in Paralimni	2014-2020	100.000	472.000	-
Energy Saving in Street Lighting				
ESSL1: Energy saving in street lighting	2013	85.000	220.920	1,7 years
Investments of Paralimni Municipality in RES				
RES1: Investments of Larnaka Municipality in renewable electricity (solar)	2014-2016	450.000	177.525	6.4 years
RES2: Investments of Larnaka Municipality in renewable electricity (wind)	2015	40.000	30.771	6.3 years
Development of Green Spaces in Paralimni Municipality				
DGS1: Ανάπτυξη χώρων πρασίνου στο Δήμο	2012-2020	11.000	90.000	-
TOTAL		**933.500**	**6.406.106**	

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

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

Table 24 Brief Presentation of Energy Saving from National Measures

NATIONAL MEASURES FOR ENERGY EFFICIENCY		Energy Saving (MWh/year)			
		Residential	Residential	Residential	Residential
1	Legislation on Energy Building Performance (Equation 1)	1.840	2.855	79	0
2	Legislation for the inspection of air conditioning and heating systems (Equation 1)	883	1.370	38	0
3	Grant Schemes for the installation of solar thermal systems (Equation 1)	309	480	13	0
4	Grant Schemes for the installation of geothermal systems (Equation 1)	221	343	10	0
5	Legislation on energy efficiency of appliances (Equation 1)	1.310	2.636	83	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)	164	302	10	0
8	Legislation on energy efficiency of buildings with area larger than 1000 m^2 (Equation 1)	0	2.855	32	0
9	Grant Schemes for cogeneration in Industry (Equation 1)	0	0	181	0
10	Plan of single urban transport system (Equation 3)	0	0	0	32.749
11	Mandatory inspection of Vehicles MOT (Equation 3)	0	0	0	22.336
12	Withdrawal Plan of old vehicles (Equation 3)	0	0	0	5.361
13	Grant Schemes for hybrid vehicles and vehicles with low CO_2 emissions (Equation 3)	0	0	0	2.859
14	Discounts on vehicles registration for vehicles with low CO_2 emissions (Equation 3)	0	0	0	3.574
	TOTAL PER SECTOR	5.118	11.166	1.096	66.878
	GRAND TOTAL	84.258			

Table 25 Brief Presentation of CO_2 Emissions Reduction from National Measures

NATIONAL MEASURES FOR ENERGY EFFICIENCY		Emissions Reduction (t CO_2/year)			
		Residential	Residential	Residential	Residential
1	Legislation on Energy Building Performance (Equation 1)	1.191	1.912	53	0
2	Legislation for the inspection of air conditioning and heating systems (Equation 1)	572	918	25	0
3	Grant Schemes for the installation of solar thermal systems (Equation 1)	200	321	9	0
4	Grant Schemes for the installation of geothermal systems (Equation 1)	143	229	6	0
5	Legislation on energy efficiency of appliances (Equation 1)	848	1.765	55	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)	106	202	6	0
8	Legislation on energy efficiency of buildings with area larger than 1000 m^2 (Equation 1)	0	1.912	21	0
9	Grant Schemes for cogeneration in Industry (Equation 1)	0	0	120	0
10	Plan of single urban transport system (Equation 3)	0	0	0	8.272
11	Mandatory inspection of Vehicles MOT (Equation 3)	0	0	0	5.642
12	Withdrawal Plan of old vehicles (Equation 3)	0	0	0	1.354
13	Grant Schemes for hybrid vehicles and vehicles with low CO_2 emissions (Equation 3)	0	0	0	722
14	Discounts on vehicles registration for vehicles with low CO_2 emissions (Equation 3)	0	0	0	903
	TOTAL PER SECTOR	3.312	7.478	728	16.893
	GRAND TOTAL	28.411			

Table 26 Equations Used for the Estimation of the Contribution of the National Measures to Energy Saving

(1) ES=EC*np*nc*ns
ES: Energy Saving (MWh) EC: Energy Consumption (MWh) np: Number of Participation (0-100%) nc: Consumption rate per consumption category (0-100%) ns: Saving Percentage by applied measure (0-100%)

(2) GE=N*P*np
GE: Green Energy (MWh) N: Population P: Production per application (MWh) np: Participation percentage (rate) (0-100%)

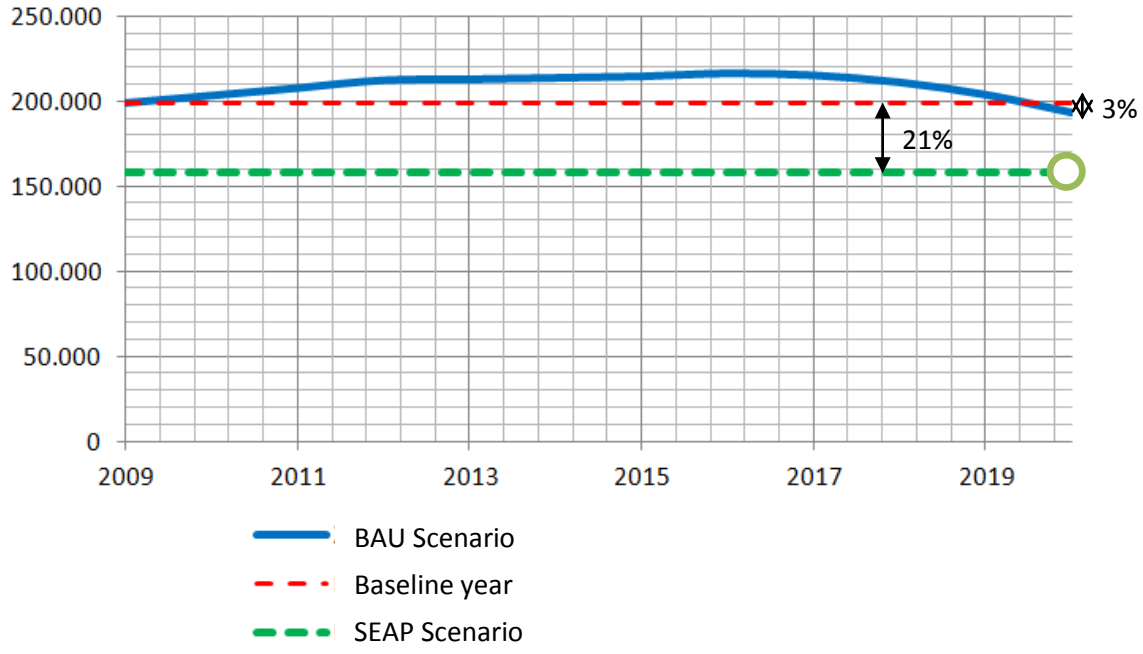
(3) EOS=(N*FO*np)+(ΔO*FO*np)
EOS: Energy Saving in terms of Fuel (MWh) N: Population FO: Fuel Saving per person (MWh) np: Participation percentage (rate) (0-100%) ΔO: Passing Vehicles

7.10 Description of Achieving CO2 Emission Reduction for 2020

The overall goal of reducing carbon dioxide emissions achieved by implementing the action plan for 2020, is 20% reduction compared to the reference year 2009. The achievement of this objective is presented in the table below.

Emission inventory for reference year 2009 (tn CO_2/year)	199.001
Expected emissions for 2020 – Expected Development Scenario (tn CO_2/year)	193.193
Estimated emission reduction from national measures for 2020 (tn CO_2/year)	28.411
Estimated emission reduction by the Municipality for 2020 (tn CO_2/year)	6.406
Total estimated emission reduction for 2020 (tn CO_2/year)	34.817
Estimated emissions for 2020 through the application of the Action Plan (tn CO_2/year)	158.376
Emission reduction percentage by 2020 compared with 2009	**21%**

Figure 19 Schematic of the Expected Evolution Scenario of CO2 Emissions in Paralimni Municipality and the Reduction Target for 2020 by 20%



Sources of energy data

- Consumption of fuels and heating fuels from oil companies within the administrative limits of Paralimni 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 Plans for Energy Saving at end-use from the Energy Service. [http://www.mcit.gov.cy/mcit/mcit.nsf]
- Grant Schemes for RES and ES from the Energy Service

[http://www.mcit.gov.cy/mcit/mcit.nsf]

- Development of Public Transport Plans from the Department of Road Transport [www.mcw.gov.cy/mcw/rtd/rtd.nsf*]*
- Electricity Consumption data in the Municipality of Paralimni from the Electricity Authority of Cyprus [www.eac.com.cy*]*
- Energy consumption data in municipal buildings in Paralimni
- 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]

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