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PACT OF ISLANDS

SUSTAINABLE ENERGY ACTION PLAN

Ergates Community Cyprus

24 April 2012

Brief Summary

The **"Pact of Islands"** (**ISLE-PACT** project) is committed to developing **Local Energy Action Plans,** with the aim of achieving European sustainability objectives as set by the EU for 2020, that is of reducing **CO_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.

From Cyprus are involving 12 municipalities and 2 of Communities one of them Ergates Community

The Community of Ergates is the 13th largest community in the Nicosia District and lies about 17 km southwest of Nicosia, in the geographic region of township.

The year 2009 was designated as the reference year / recording of energy consumption and CO2 emissions in the City. According to actual consumption data collected by the Electricity Authority of Cyprus, the oil companies, etc. Statistical Service of Cyprus total energy consumption in Ergates 2009 was 44.412 MWh. The largest consumer of energy in the municipality is the transport 118.629 MWh, then the tertiary sector with 17.567 MWh.

The CO2 emissions in 2009 attributable to the overall energy consumption in the municipality are 21.077 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 22.064 tons.

The Sustainable Energy Action Plan prepared for the Municipality includes additional measures / actions to achieve at least the European goal of combating climate change. That is, the measures that will be taken by the Municipality in addition to national measures in order to overcome the goal of reducing 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 Savings in Municipality public buildings	3
Energy savings via informational campaigns	9
Energy savings in transport	2
Energy savings in street lighting	1
Municipality investments in renewable energy	1

The estimated annual emission reduction for 2020 with the implementation of the above measures amounts to 5,201 tons. Also, it was estimated that the impact of the Community's application of the national measures taken to reduce emissions of carbon dioxide will be an additional reduction of approximately 2,598 tons.

The annual estimated emission reduction for 2020 with the implementation of the above measures is approximately 5.201 tons. Also, it was estimated that the impact on Ergates Community from the application of the national measures taken to reduce emissions of carbon dioxide will be an additional reduction of approximately 16.862 tons.

That is, 20% less than the reference year is 2009.

The budget of the Action Plan for the period 2011 to 2020 amounts to € 243.050 Funding for the implementation of the Energy Action Plan is expected to stem from the following resources:

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

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1. THE ISLE-PACT PROJECT

1.1. Introduction

The main objective of the ISLE-PACT project is the development of Local Sustainable Energy Action Plans, aiming at achieving European sustainability objectives as set by the EU for 2020, namely a reduction of 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 Eileen Siar (CnES) – The Outer Hebrides of Scotland. The project is funded by the European Commission, Directorate General for Energy.

EUROPEAN COMMISSION Directorate-General for Energy

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

1.1 Commitments from signing the Covenant of Islands

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

- Further implementation of EU targets for 2020, reducing CO_2 emissions by at least 20% in areas of implementation,
- The preparation of the Sustainable Energy Action Plan, which includes the original recording of emissions data (Baseline Emission Inventory), and outlines the methods for achieving the objectives,
- The preparation and submission of implementation reports at least every 2 years after delivery of the final Sustainable Energy Action Plan for evaluation, monitoring and verification of individual goals,
- To organize Energy Days, in collaboration with the European Commission and other stakeholders (e.g. Cyprus Energy Agency), providing an opportunity for citizens to have direct contact with the subject and also to benefit directly from sustainable energy use, as well as informing the local media for individual developments in local action plans,

- Participation in various conferences and workshops organized by various European institutions in connection with the Covenant of Mayors and the Pact of Islands,
- Further implementation of energy investment in the project areas.

1.2 Participating Municipalities and Communities in Cyprus

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

MUNICIPALITIES-COMMUNITIES	
Strovolos Municipality	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	Idalion Municipality
Strovolos Municipality	Lefkara Municipality

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

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

Picture 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)

Picture 3 The Mayor of Agios Athanasios Kyriakos Xatzittofis (left) and the Mayor of Aglantzia Andreas Petrou (right)

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

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

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

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

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

Picture 9 The President of Psimolofou Community Ioannis Lazarides

2. CYPRUS

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

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

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

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

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

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

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

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

Source: http://europa.eu

3. ERGATES COMMUNITY

3.1. Introduction

The Community of Ergates is the 13th largest community in the Nicosia District with approximately 2,000 residents and is located just 17 km southwest of Nicosia, in the geographic region of township. The village is situated on the west bank of the river or Pedieos Pidias at an average altitude of 340 meters. The landscape is fragmented by the river system Pedieos.

In the Community average annual rainfall is around 360 mm and the area of cultivated cereals, vegetables, forage crops, a few olives and fruit trees such as apricot (cesium) and fig. The irrigated lands are located between the main road works - Annaya, Projects - episcopate and the river Pedieos. Under applied small irrigation project which benefited both the river and local punches.

The road connecting the Community is quite good. To the north associated with the Community Anayia (2.5 mi.) And through the city of Nicosia. To the south is linked to the episcopacy Community (1.5 mi.) And to the east by the Community Psimolofou (1 km.). To the west is associated with the Industrial Area and through the suburban street Nicosia - Palaichori.

Picture 10 Panoramic view of the Community

[Source: http://www.ergates.org]

3.2. History

The Community was known by the same name, at least since the time of Frankish and medieval maps marked as Ergates. At the time of Frankish and a feud during the period of Turkish Evkaf acquired within the Community area (north and northwest of) a lot of real estate.

Ergates are one of the communities of the ancient kingdom Tamassos the name has a direct relationship with the workers who worked in the copper mines of Tamassos, operating during that era. The workers of the mines chose this place, on the left bank of the river Pedieos to create the settlement thereof. The abundant water of the river with small hills, protecting the neighborhood from flooding, makes the ideal place to live. Slowly the little huts multiply and whoever wanted to go to the neighborhood saying "I'm going to Labor." Then when the mines closed in the name Workers stayed in the village to keep up to date. Probably the settlement

developed during the Roman period (perhaps in the early Christian era), when there were still mines of Tamassos.

The population grew steadily Ergates from 1881 until today. The phenomenon of urbanization affecting most communities in Cyprus from 1946 and especially from 1960 onwards, did not affect the Community Workers. In this contributed to a relatively short distance of the Community from the capital of the good road connection therewith and employment opportunities in the region. In 1881, Labor had 218 inhabitants, which increased to 234 in 1891 to 262 in 1901, to 293 in 1911, to 354 in 1921, to 378 in 1931, to 431 in 1946, to 637 in 1960 and 812 in 1973. With the settlement of refugees from the occupied part of Cyprus after the Turkish invasion of 1974, residents of Workers increased to 1,044 in 1976 and 1,121 in 1982. In the last census in 2001 the inhabitants of the village was 1587 and now exceeds the 2,000 residents after residing in the Community and a number of foreigners working in the Industrial Area. The Community has been very active in social and cultural life and has become a Community template for the region.

Today in the Community of Ergates are several services and infrastructure. Some of them:

- Building Community Council
- Community Health & Community Library
- Post
- Primary School & Kindergarten State
- Kids Club & Vrefopaidokomikos Station
- SEA Tamassos
- Associations (SA-PEK ARION)
- Cultural Group Projects & Folklore "The Madaline"

In the community there are two churches dedicated to Agia Paraskevi and the Apostle Thomas.

Picture 11 Thomas the Apostle Church

PIcture 12 Church of Agia Paraskevi

Most residents work in Nicosia or the suburbs, others do not operate their own businesses and others working in the industrial areas in our community, while fewer engaged in agriculture and animal husbandry. The creation of an industrial area, advocated the economic development of the Community, which currently operates about 70 plants.

3.2.1. Industrial Area

A new factor which advocated economic development is the creation of an industrial area, just outside the Community. This absorbed a large number of residents who previously had to go to work in Nicosia.

Picture 13 Ergates Industrial Area

The Ergates Industrial Area of the region, area 428 acres, estimated to house about 80 factories. Work to completion planned in 2 phases. The phase has been completed and operating 51 factories and the second phase another 15 factories. The proximity to the industrial area of Nicosia and good roads, reinforced in high demand for industrial land so there were no more available land.

3.2.2. Environment

The Community of Ergates involved in various projects to promote sustainable development with emphasis in the environmental sector:

• The Community (December 2003 - September 2004) at bi program sponsored by USAID and UNDP and executed by UNOPS. The project was a pilot and had as its theme "Assessment of Organic Waste Generation Sources in Urban and Rural Areas in Cyprus." Partners were the organization COAST Project and Research Centre, the Municipality Aglantzia, the Community Workers and the Environmental Organization poplar. The program involved 15 families from the Community Workers and 45 families from the municipality Aglantzia.

• Community participation (from May 2006) in the European Union Programme funded by UNDP on the 'home composting' ('Home Composting'). The program is of great interest because of the garbage generated in the home and garden should come first quality compost. The program, which involved 16 families from the Community Ergates are expected to be completed by the end of November.

• Submission of a joint proposal to the European Community Initiative Programme «INTERREG III B / ARCHIMED», Measure 3.1 "Protection, Planning and Management of Natural Resources and Landscape" to fund the project: «No Waste MED! » International Partners with the City of Eleusis (GREECE), the Municipality of Sifnos (GREECE), Community Workers (Cyprus), the Municipality of Paros (GREECE) and the Ecological Recycling Society (GREECE).

Picture 14 Σ Community participation in a bi-communal and European Projects

[Source: http://www.ergates.org]

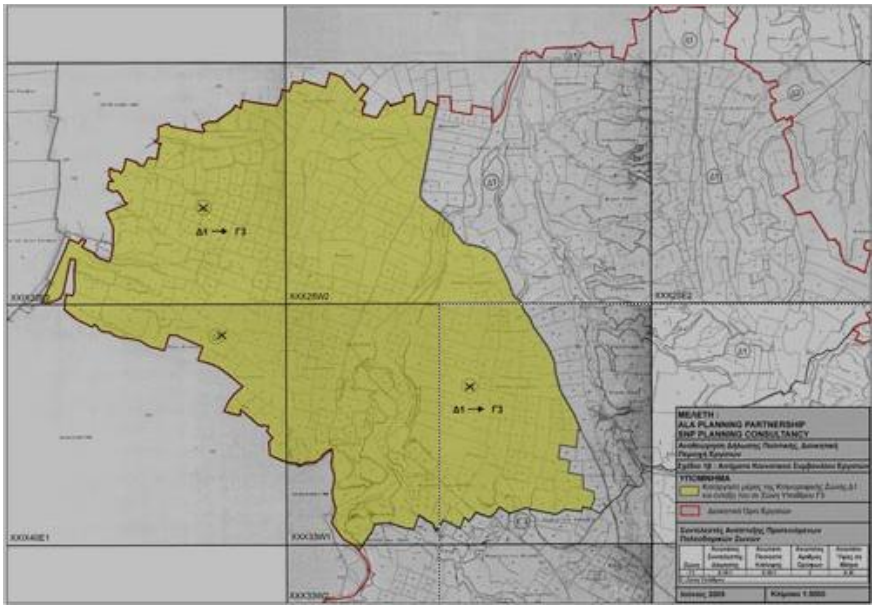
3.3. Urban Zones

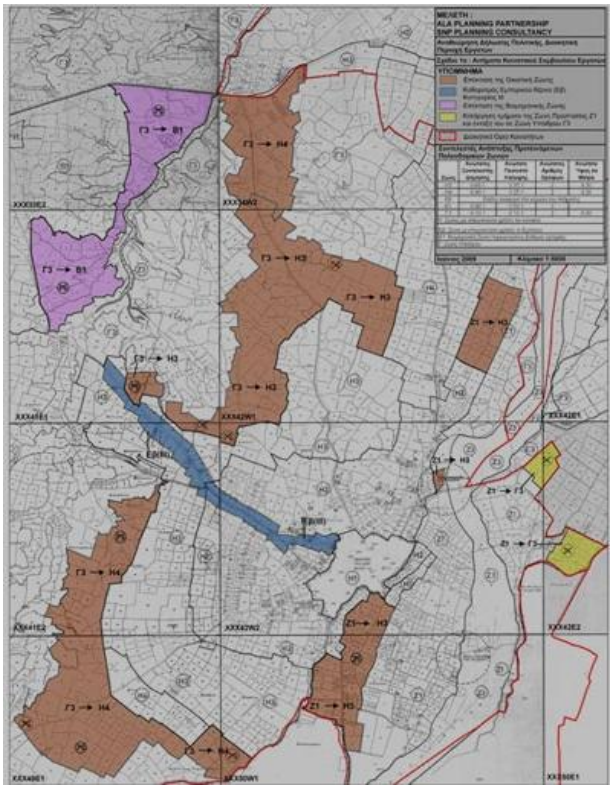
The Community Council has filed on June 26, 2009 in Nicosia District Administration's proposal, anticipating the process of reviewing and amending Policy Statement. The Community Council of Labour following all procedures established by the Minister of Interior has submitted plans, suggestions and comments on the modification of urban areas in the Community Workers, copies of which are available at the offices of the Community Council, to inform interested parties.

Picture 15 Building Community Council Ergates

The following illustration shows the existing and proposed urban areas within the Community Ergates

[Source: http://www.ergates.org]





Picture 16 Existing and proposed Urban Zones Community Ergates.

4. CURRENT SITUATION IN THE COMMUNITY ERGATES

4.1. Description of buildings of Community Ergates

4.1.1. Brief description

- The hours of operation for all Community services are 7:30 to 14:00 for the summer season (June 1 - August 31) and for the remaining months the hours are 7:30 to 14:30 and every Wednesday until 18: 00.
- There is no central heating system that requires the consumption of oil, gas etc but the heating system is the same as for cooling buildings.
- In all buildings of the Community there are solar panels for water heating and no building is not installed photovoltaic system.

4.2. Street lighting in Ergates Community

The total energy consumption in 2009 for streetlights was equal to 147MWh while the total energy consumption in 2010 for streetlights was equal to 150MWh

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

Table 1 Light bulbs for street lighting in Ergates Community

HPS*	150 W
HPS	70 W
Compact	21 W

* High Pressure Sodium

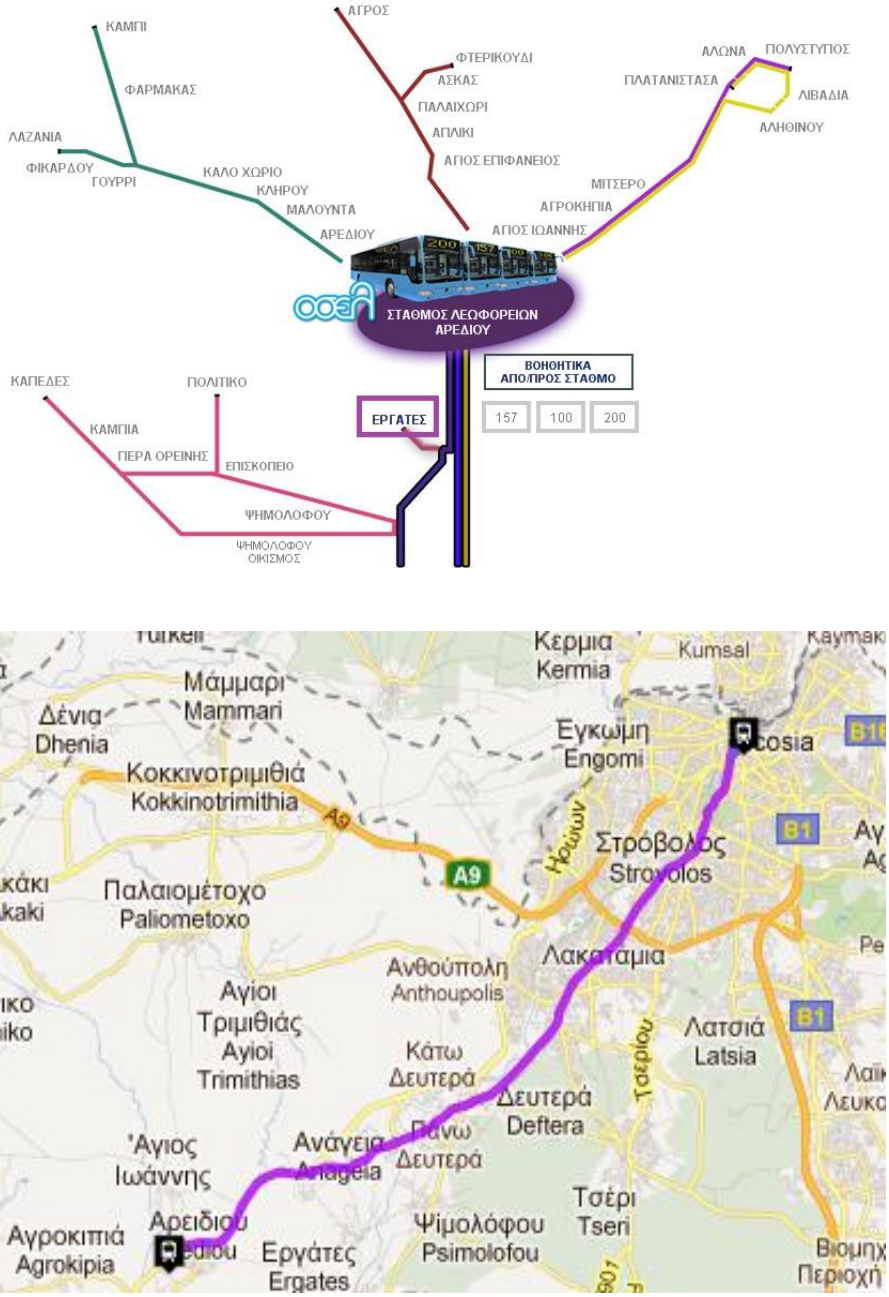
The period of power can be increased from sunset to sunrise if requested by the Community.

4.3. Public transport

Public transport in the boundaries of the Community made by ton Nicosia District Communications Agency (O.S.E.L). Future goals are to strengthen O.S.E.L of public passenger transport and to increase the use of the bus by 2% today to more than 10%, which is the goal of the ministry until 2019. Aims by 2013 to install integrated fleet management system and machines issuing and cancellation of tickets in order to the travelling public can be better and easier movement of buses. Even to enhance a driver through frequent training of staff at all levels. We tried through various programs through the Department of Education and the Ministry of Communications to promote and consolidate the use of the bus for children, changing the culture of using public means of transport.

The services performed by the O.S.E.L the Community is the route 100 and 157 (Solomos Square / Login to Stop Industrial Workers - Station Arediou) and route 200 (General

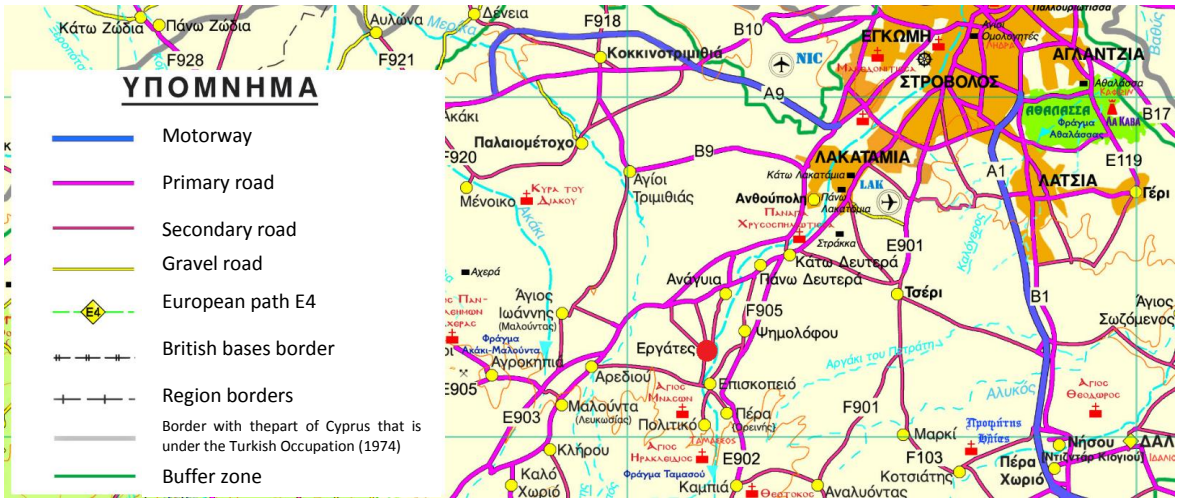
Hospital / Login to Stop Industrial Workers - Station Arediou). Details of the routes available on the Agency's Communications Nicosia District www.osel.com.cy.



Picture 17 Utilities Service to Ergates Community and detailed Itinerary 157 (Source: www.osel.com.cy)

4.4. Ergates Road network

The main road network of Ergates Community shown below.



Picture 18 Main road Network of Ergates Community

4.5. Completed and planned infrastructure projects

Ergates Community has been very active in various development projects in order to better serve the residents and the quality of life in the Community.

4.5.1. Social Sector

- The offices of the Community Council and the Community Library is open every day serving both residents and factories located in the Industrial Area.
- • The health and service the residents, especially the elderly and housewives
- • The Community Council with the right manipulations managed to increase revenues from other sources and keep a very low level of taxes. Has exempted from taxation elderly people over 70 years, while symbolically taxed retirees aged between 65 and 70 years old and single parent families. Also reduced is the taxation of large families and displaced persons in self-help.
- • Inclusion in the residential zone of the state workpiece 27 separate plots for indigent and low-income families.
- • Cooperation with the Land Development for housing construction in the Community and placing them in families and young couples with low incomes.
- • The Council of Ministers recently (November 2008) has given the Community area opposite the offices of the Community Council for the construction of Community Park in memory of the EOKA hero Stavrou Stylianidis who was active in the Community and Park missing the Turkish invasion (1974).
- • supported and supports financially, morally and practically all actors and organized the entire community.

4.5.2. Water Board

- Continuous water supply and continuity of the Community over the last 6 years and since May 2008 due to the continuing drought, linking the EU with two private water supply wells to meet the daily water needs of the Community.
- • The expansion of the water supply network in the area where it was necessary.
- • The replacement of iron pipes, 1.200 meters long, carrying water from the cisterns Community perforation.
- • Installation and Auto chloriotira water cisterns in the Community to protect the health of residents.
- • Planning for construction of a new water tank capacity of 500 cubic meters water in 2009, which enables the Community in the event of network maintenance or damage to water pumps and have the appropriate supplies.
- • The connection of the water supply of the Community with the conductor of the Water Development Department (WDD) apavline much big water shortage problem facing the Community due to the continuing drought. In response to the scarcity of the Community Council has made representations to the Department of Water Development, which has prepared a draft water transportation of drilling have anorychthei in Mahara, to enhance water supply both Community Workers, and the other communities in the region Tamassos. The implementation of the above project is scheduled to begin in January 2009 and be completed by April of that year.

4.5.3. Flood Control Projects

The greatest work that has been done in the Community is the flood control Project that has already begun and the cost is estimated to exceed £ 500,000. This project will solve the major problem faced several houses at the junction of the roads Katelaris P. - M. Karaoli - E. Pallikarides. The first phase of the project includes square culvert length of 180 meters and 400 meters underground pipeline for transport of rainwater from self-help to Argaki. The tender for Phase A of the project has been awarded to Patsalos Bros Ltd for the sum of £ 230,000. The project is completed by December 2006 and the total cost has risen to £ 269,000 (€ 460,000).

Picture 19 construction stormwater culvert

Regarding the second phase according to the instructions of the Minister of the Interior should, before the end of the summer of 2006 to prepare the construction drawings and after making any necessary studies and cost estimates will be launched tenders for construction. The Second phase will start in 2007 and is projected to cost more than £ 350,000.

PIcture 20 Flood control projects in the Community

- • constructed culverts and pavements Street Gr Afxentiou and April 1.
- • constructed culverts Arch Kyprianou Street & St. Paraskevi.
- • constructed culverts and pavements Street Bellapais Mia Milia and around the community park.
- • Build long bridge to Psimolofou to resolve the problem of Argaki overflow.

Picture 21 Flood control projects in the Community

4.5.4. Embellishing

- Renovation of the space in front of the offices of the Community with sidewalks and green spaces.
- • Create park in self-help housing construction and small amphitheatre. The cost to complete the project amounted to £ 62,000.
- • Renovation of the Community Park Street on April 1.
- • Creating green spaces in different parts of the Community.
- • Paving of sidewalks in self-help housing and construction of pavements Street Pantelis Katelaris.

Picture 22 Embellishment projects. Community Amphitheatre

4.5.5. Central Square

The Community proceeded in 2003 market space 680sqm to build central square where in 2006.6.

Picture 23 Central Square Ergates Community

[Source: http://www.ergates.org]

4.6. Production and management of solid waste in the Ergates Community

Concerning the production of household waste at municipal level, data are available in Nicosia area and to the quantities produced in the municipalities of Nicosia, and driven to the place of disposal area Kotsiatis (data up to 1999). These data are available to the Statistical Service of Cyprus and from measurements made by the Municipality of Nicosia (daily weightings of garbage who entered the disposal site, for one week). The purpose of these measurements was to calculate the annual amount of waste resulting from the disposal area municipalities and communities in order to determine the fees and disposal per Municipality and Community.

Based on the data in Table 4, it seems - as expected, that the amount of household waste, increasing over years and even have nearly doubled from year 1991 to year 1999. This is mainly due to the increase in population of Nicosia, and improving the living standards.

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

Municipalities and Nicosia wider region	1991	1994	1999
Nicosia Municipality	27.361	30.377	36.266
Strovolos Municipality	20.499	24.560	40.522
Engomi Municipality	4.730	6.544	10.534
Ag.Dometiou Municipality	5.403	4.515	8.224
Aglantzia Municipality	5.663	6.490	14.451
Latsia Municipality	3.064	3.892	13.067
Lakatamia Municipality	**5.047**	**8.614**	**12.839**
Complex Deftera Anthoupolis	4.472	1.565	2.361
Complex Dali-Pera Chorio Nisou	4.129	3.949	6.900
Complex Lythrodontas	2.444	3.028	3.427
Cluster Ergates		**1.940**	**1.970**
Complex Kornos		712	1.170
Geri Improvement Board	1.352	1.262	1.716
Improvement Board Geri	332	286	754
Gouri-Kalo Chorio		317	369
Mathiatis			312
Palaichori			520
Arediou		260	
Industrial Area Ergates		**478**	
Total	**84.496**	**98.789**	**155.402**

[Source: Statistical Services Cyprus]

4.7. Materials recycling program in Ergates Community

The program is collecting recyclables to the limits of the Community Workers performed by a contractor of the nonprofit organization Green Dot Cyprus.

Within the boundaries of Community recycling bins placed, PMD (blue), paper (brown) and glass and meditation is done every week.

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

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

A/A	Street	Point
E01	7 Griva Digeni	Ergates Primary School
E02	5 Pedieou	Pediaios Bridge
E03	20 Arch. Makriou III	Anayia Exit
E04	13 Panteli Katelari	Episkopio Exit
E05	21 Grigori Afxentiou	Town Hall
E06	59 Grigori Afxentiou	Industrial Area
E07	37 Ayias Paraskevis	Ayia Paraskevi Church

[Source: http://www.csr-ccci.org.cy]

4.8. Population of Ergates Community

In the last census of 2001 carried out by the Statistical Service of Cyprus, the inhabitants of the village were 1587 and 2000 far beyond the residents after living in the Community and a number of foreigners working in the Industrial Area. The Community has been very active in the social, cultural and Community-has become a model for nearby

4.9. Organized bodies

In community operated 13 organized groups, which each one individually and together contribute to an improved quality of life and cultural promotion of the Community. Organized groups operating in the community are the Clubs SA-SBC and Arion, Cultural Society, the Folklore Society, the Hunting Association of EAGLE, the Church Committee of Holy Friday, the Women's Christian Association, the Committee on Blood Transfusion, the Community Welfare Council, the Links Parents of elementary school, kindergarten and Community Welfare Council. Since 1945 operates Workers Cooperative Credit Society, which since June 2007 merged with six other companies, created the AER Tamassos. The SEA Tamassos is the major sponsor and supporter of all organized groups, such as Community Workers and other Communities Tamassos.

5. INVENTORY OF ENERGY CONSUMPTION IN ERGATES COMMUNITY

5.1. Residential sector

Table 3 Energy demand in the residential sector MWh for 2009

Description	Electricity	Oil products	Liquefied Petroleum Gas	Solar	Geothermal	Biomass	**Total**
Hot Water usage	85	75	5	347	3	19	**534**
Heating and cooling	2.051	1.223	144	11	7	180	**3.615**
Lighting	114	-	-	-	-	-	**114**
Kitchen	85	-	37	-	-	0	**122**
Electrical appliances	513	-	-	-	-	-	**513**
Total	**2.848**	**1.298**	**1.298**	**358**	**10**	**199**	**4898**

5.2. Primary sector

Table 4 Energy demand in the primary sector MWh for 2009

Description	Electricity	Oil Products	Petroleum	Liquefied Petroleum Gas	Biomass	**Total**
Agriculture, Forestry and Fisheries	1.203	165	107	240	481	**2.196**
Mines and Quarries	-	-	-	-		**-**
Total	**1.203**	**165**	**107**	**240**	**481**	**2.196**

5.3. Secondary Sector

Table 5 Energy demand in MWh in the secondary sector for the year 2009

Description	Electricity	Oil Products	Petroleum	Liquefied Petroleum Gas	Biomass	**Total**
Processing	13.609	1.866	1.206	600	200	**17.482**
Water supply, sewerage and waste management	52	7	5			**64**
Construction	17	2	2			**21**
total	**13.678**	**1.876**	**1.213**	**600**	**200**	**17.567**

5.4. Tertiary sector

Table 6 Energy demand in MWh in the Tertiary sector for the year 2009

Description	Electricity	Oil Products	Diesel	Liquefied Petroleum Gas	Biomass	**Total**
Wholesale and retail trade, repair of motor vehicles and motorcycles	241	33	21	10	3	**309**
Hotels and restaurants	21	3	2	1	0	**27**
Public administration and social security	118	16	10	5	2	**151**
Defense, Justice, Police and Fire	-	-	-	-	-	**-**
education	75	10	7	3	1	**96**
Men Health and Social Care	-	-	-		-	**-**
Other Services	305	42	27	13	4	**391**
Public Lighting	147	-				**147**
total	**907**	**104**	**67**	**33**	**11**	**1.122**

5.5. Transports

Table 7 Final energy consumption in MWh for 2009 in transport

Description	Electricity	Diesel	Gasoline	Biomass	Total
Urban and suburban passenger transport services	0	193	179	0	**373**
Other passenger services (taxi, tourism, school buses, etc.)	0	3.093	2.868	0	**5.961**
Commercial ground transport services	0	0	0	0	**0**
Private vehicles	0	6.380	5.916	0	**12.295**
Total	**0**	**9.666**	**8.963**	**0**	**18.629**

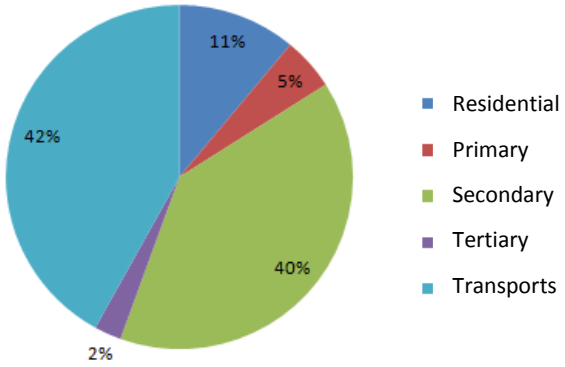
5.6. Total final energy consumption in Ergates Community

Table 8 Final energy consumption in transport in MWh for 2009

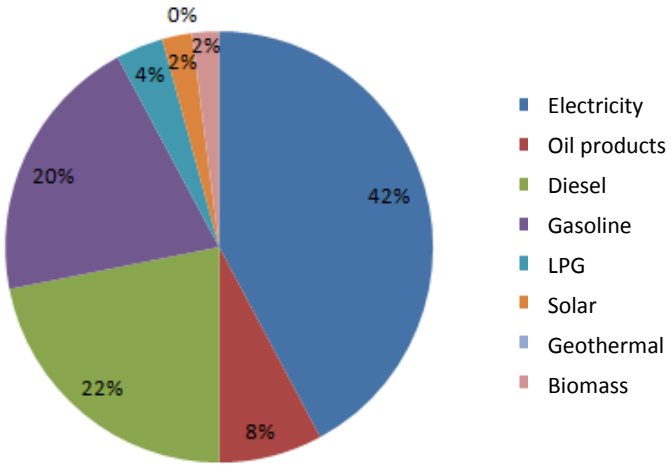
Sector	Electricity	Oil Products	Diesel	Gasoline	Liquefied Petroleum Gas	Solar	Geothermal	Biomass	**Total**
Residential	2.848	1.298	-	-	186	358	10	199	**4.898**
Primary	1.203	165	-	-	107	-	-	481	**2.196**

Secondary	13.678	1.876	-	-	1.213	600	-	200	**17.567**
Tertiary	907	104	-	-	67	33	-	11	**1.122**
Transforms	-	-	9.666	8.963	-	-	-	-	**18.629**
Total	**18.636**	**3.443**	**9.666**	**8.963**	**1.573**	**990**	**10**	**891**	**44.412**

Picture 24 Share of final energy consumption by energy source in 2009



Picture 25 Share of final energy consumption by energy source in 2009



6. CO2 EMISSIONS INVENTORY IN ERGATES COMMUNITY

6.1. Introduction

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

Table 9 Coefficients for calculating CO2 emissions

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

6.2. Residential sector

Table 10 Tons of CO2 emissions for the residential sector for the year 2009

Description	Electricity	Oil products	LPG	Solar	Geothermal	Biomass	**Total**
Hot Water usage	68	21	1	-	-	-	**91**
Heating and cooling	1.642	341	35	-	-	-	**2.018**
Lighting	91	-	-	-	-	-	**91**
Kitchen	68	-	9	-	-	-	**77**
Electrical appliances	411	-	-	-	-	-	**411**
Total	**2.281**	**362**	**45**	**-**	**-**	**-**	**2.688**

6.3. Primary Sector

Table 11 Tons of CO2 emissions in the primary sector for the year 2009

Description	Electricity	Oil products	Diesel	LPG	Biomass	**TOTAL**
Agriculture, Forestry and Fisheries	964	46	0	26	-	**1.035**
Mines and Quarries	-	-	0	-	-	**-**
Total	**964**	**46**	**0**	**26**	**-**	**1.035**

6.4. Secondary section

Table 12 Tons of CO2 emissions in the secondary sector for the year 2009

Description	Electricity	Oil products	LPG	Solar	Geothermal	Biomass
Processing	10.900	521	289	-	-	**11.710**
Water supply, sewerage and waste management	42	2	1	-	-	**45**
Construction	14	1	0	-	-	**15**
Total	**10.955**	**523**	**291**	**-**	**-**	**11.770**

6.5. Tertiary sector

Table 13 Tons of CO2 emissions in the tertiary sector for the year 2009

Description	Electricity	Oil Products	LPG	Solar	Biomass	**Total**
Wholesale and retail trade, repair of motor vehicles and motorcycles	193	9	5	-	-	**207**
Hotels and restaurants	17	1	0	-	-	**18**
Public administration and social security	95	5	3	-	-	**102**
Defense, Justice, Police and Fire		-	-	-	-	**-**
Education	60	3	2	-	-	**65**
Men Health and Social Care	-	-	-	-	-	**-**
Other Services	244	12	6	-	-	**262**
Public Lighting	118	-	-	-	-	**118**
Total	**726**	**29**	**16**	**-**	**-**	**772**

6.6. Transports

Table 14 Tons of CO2 emissions in transport for 2009

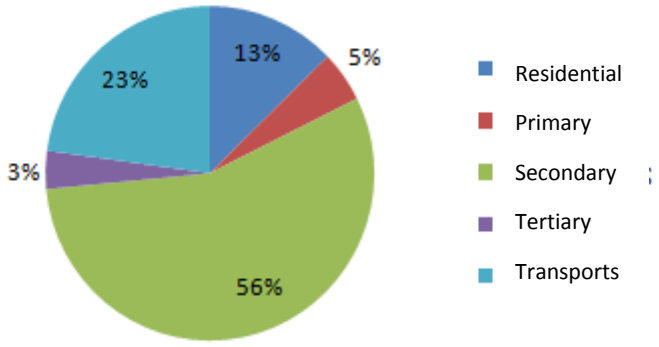
Description	Electricity	Diesel	Gasoline	Biomass	**Total**
Urban and suburban passenger transport	-	52	45	-	**96**
Other passenger services (taxi, tourism, school buses, etc.)	-	826	714	-	**1.540**
Commercial ground transport services and displaced	-	-	-	-	**-**
Private vehicles	-	1.703	1.473	-	**3.176**
Total	**-**	**2.581**	**2.232**	**-**	**4.813**

6.7. Total CO2 emissions in Ergates Community

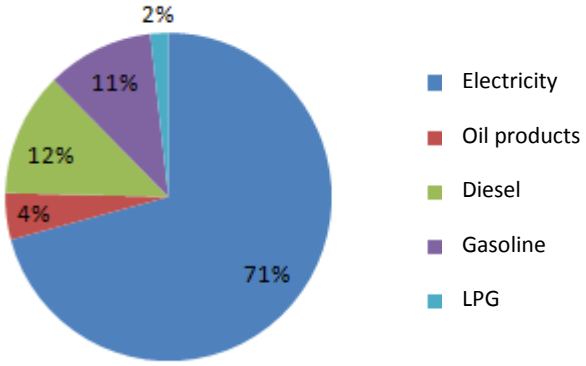
Picture 26 Tons of CO2 emissions in transport for 2009

Section	Electricity	Oil Products	Diesel	Gasoline	Liquefied Petroleum Gas	Solar	Geothermal	Biomass	**Total**
Residential	2.281	362	-	-	45	-	-	-	**2.688**
Primary	964	46	-	-	26	-	-	-	**1.035**
Secondary	10.955	523	-	-	291	-	-	-	**11.770**
Tertiary	726	29	-	-	16	-	-	-	**772**
Transports	-	-	2.581	2.232	-	-	-	-	**4.813**
Total	**14.926**	**961**	**2.581**	**2.232**	**378**	**-**	**-**	**-**	**21.077**

Picture 27 Share of CO2 emissions by sector in Ergates Community for 2009



Picture 28 Share of CO2 emissions per energy source in Ergates Community for 2009



6.8. Forecasting Scenario for CO2 emissions

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

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

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

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

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

Table 15 Growth rates of energy consumption per consumer scenario used in the expected evolution

Description field	Estimated annual growth rate of energy consumption
Residential	
Hot Water	2%
Heating and cooling	2%
Lighting	2%
Cooking	2%
Refrigerators and freezers	2%
Washers and dryers	2%
Dishwashers	2%
Televisions	2%
Other electrical appliances	2%
Primary sector	
Agriculture, forestry and fishing	2,0%
Mining and quarrying	0,0%
Secondary sector	
Processing	3,0%
Water supply, sewerage, waste management and remediation activities	1,5%
Construction	1,0%
Tertiary sector	
Wholesale and retail trade, repair of motor vehicles and motorcycles	2,0%
Service activities Accommodation and food services	2,0%
General public administration and social security	2,0%
Defense services and justice, and police bodies	2,0%
Education	2,0%
Activities related to human health and social care	2,0%
Other services	2,0%
Municipal / Public Lighting	2,0%

Transportation (vehicles)	
Private transport	2,5%
Urban and suburban passenger land transport	1,0%
Other road passenger transport services (taxis, tourism, school buses, etc.)	2,0%
Freight transport by road and removal services	0,0%
Secondary energy	
Solar energy to generate electricity	3,0%
Wind energy to generate electricity	0,0%
Solar energy for heating and cooling	0,0%
Geothermal heating and cooling	1,0%

Table 16 Increasing efficiency in end-use energy (reduction of final energy for the same useful energy)

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

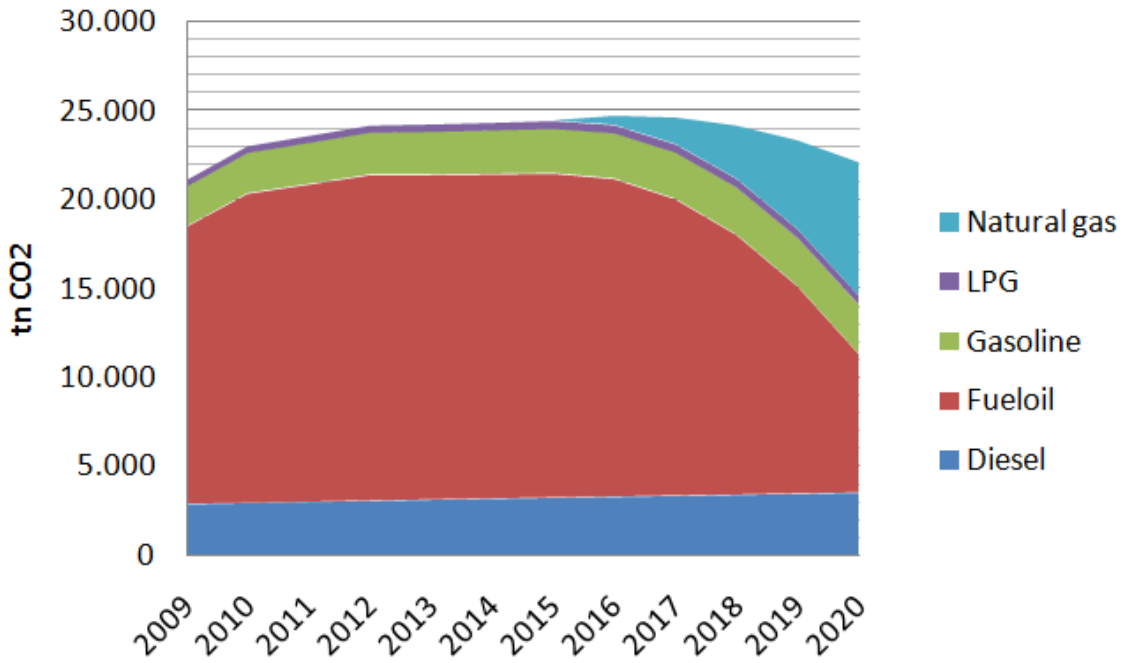
Table 17 Factors for energy efficiency for electricity production

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

Picture 29 Expected evolution scenario for forecasting CO2 emissions for the period 2009 to 2020

Year	Petroleum Products	Petroleum	Gasoline	LPG	Natural Gas	Total	Increase relative to 2009
2009	15.608	2.860	2.232	378	0	**21.077**	0%
2010	17.417	2.918	2.276	388	0	**22.998**	9%
2011	17.876	2.977	2.321	398	0	**23.572**	12%
2012	18.348	3.038	2.366	409	0	**24.161**	15%
2013	18.294	3.100	2.413	420	0	**24.228**	15%
2014	18.258	3.163	2.461	432	0	**24.314**	15%
2015	18.250	3.215	2.509	443	0	**24.418**	16%
2016	17.897	3.269	2.559	455	491	**24.671**	17%
2017	16.698	3.324	2.609	468	1.479	**24.578**	17%
2018	14.631	3.381	2.661	480	2.971	**24.124**	14%
2019	11.671	3.440	2.713	494	4.974	**23.292**	11%
2020	7.796	3.500	2.767	507	7.494	**22.064**	5%

Picture 30 Scenario Expected evolution to predict the CO2 emissions for the period 2009 – 2020



7. ENERGY ACTION PLAN FOR ERGATES COMMUNITY FROM 2011 TO 2020

7.1. Introtuction

The Sustainable Energy Action Plan that has been prepared for the Community includes additional measures/actions so as to achieve at least the European goal of combating climate change. This includes measures taken by the Community, 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.

Annual base emissions in 2009 (tn CO_2/year)	**Expected annual emissions in 2020 (tn CO_2/year)**	**Average emissions growth (tn CO_2/year)**	**Minimum emissions target in 2020 (tn CO_2/year)**	**Desired minimum (20%) emissions reduction (tn CO_2/year)**
21.077	22.064	90	16.862	5.202

Despite estimating and aggregating the contribution of national measures in the Sustainable Energy Action Plan, the achievement of the national goals cannot be determined by the Municipality. 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 key areas:

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

7.2. Energy efficiency in public buildings

Measure EE1: Energy Saving in the Town Hall

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

Implemented period: 2012

Measure Code	**EE1**			
Measure Name	**Bulbs replacing**			
APPLICATION COST				
Investment Cost	**Cost (€)**			
Lamp Replacement (30)	**150**			
Operation Cost				
Lamp Replacement	**0 €**			
Indirect Cost				
	☐ **– High** ☐ **– Medium** ☒ **– Low**			
APPLICATION BENEFIT				
Energy	**Energy Saving (kWh/year)**			
	1.150			
Financial	Energy Saving (kWh/year)	Average electricity price (€/kWh)	**Saving (€/year)**	
	1.150	0.25	**287,5**	
Environmental	**Emission Saving (kg_{CO2}/ year)**			
	1.005			
RESULTS – EVALUATION				
Unit Cost (€/$kgCO_2$)	**0,15 €/ $kg_{CO2\ annual\ saving}$**		**Proposed for implementation** ☒	
MEASURE TO IMPLEMENT				
Total Cost	**Saving**	**Emissions Reduction**	**Repayment / depreciation**	
150 €	**287,5 €**	**1.005 Kg_{CO2}/ year**	**0,52 years**	

Measurer EE 2-- Maintenance of heating and air conditioning

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	**EE 2**		
Measure Name	**Maintenance of heating and air conditioning**		
APPLICATION COST			
Investment Cost	**Cost (€)**		
Maintenance of heating	**0**		
Operation Cost			
Maintenance of heating and air conditioning	**200 €/year**		
Indirect Cost			
	☐ **– High** ☐ **– Medium** ☒ **– Low**		
APPLICATION BENEFIT			
Energy	**Energy Saving (kWh/year)**		
	2.000		
Financial	Energy Saving (kWh/year)	Average electricity price (€/kWh)	**Saving (€/year)**
	2.000	0.25	**500**
Environmental	**Emission Saving (kg_{CO2}/ year)**		
	1458		
RESULTS – EVALUATION			
Unit Cost (€/$kgCO_2$)	**0,147€/ $kg_{CO2\ annual\ saving}$**	**Proposed for Implementation** ☒	
ΜΕΤΡΟ ΠΡΟΣ ΥΛΟΠΟΙΗΣΗ			
Total cost **200 €**	**Saving** **250 €**	**Emission Saving** **1458Kg_{CO2}/ year**	**Repayment** **0,4 years**

Measure EE3: Renewable Electricity from Photovoltaic Systems on Community 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 2013-2016

Measure Code	**EE3**		
Measure Name	**Renewable Electricity on Community Buildings**		
APPLICATION COST			
Investment Cost	**Total (€)**		
Photovoltaic System 20 kW	**50.000**		
Operation Cost			
Photovoltaic System 20 kW	**0 € (negligible cost for periodic module cleaning)**		
Indirect Cost			
	☐ **– High** ☒ **– Medium** ☐ **– Low**		
APPLICATION COST			
Energy	Power (kW)	Electricity Generation (kWh/kW.year)	**Green Energy (kWh/year)**
Photovoltaic System 20 kW	20	1500	**30.000**
Financial	Green Energy (kWh/year)	Subsidized price of electricity (€/kWh)	**Income (€/year)**
Photovoltaic System 20 kW	30.000	0.25	**7.500**
Environmental	Emission Reduction factor (kg_{CO2}/kW.year)	Power (kW)	**Emissions saving (kg_{CO2}/ year)**
Photovoltaic System 20 kW	1.183	20	**23.660**
RESULTS – EVALUATION			
Unit Cost (€/kg CO_2) ***Photovoltaic System 20 kW***	**2,11€/ $kg_{CO2\ annual\ saving}$**		**Proposed for implementation** ☒
MEASURE TO IMPLEMENT			
Total Cost **50.000 €**	**Income** **7.500 €**	**Emissions Reduction** **23.660 Kg_{CO2}/ year**	**Repayment** **6.67 years**

7.3. Energy saving through awareness raising campaings

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

The organization of an annual seminar on Renewable Energy Sources (RES) in Ergates Community 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	**2.000 €**	
Indirect Cost	☒ **– High** ☐ **– Average** ☐ **– Low**	
APPLICATION BENEFITS		
Energy Financial (Green Energy €/year) Environmental (kg CO_2-eq)	**54.000 kWh/year** The financial benefits for interested parties **42.606 kg_{CO2}/year**	
RESULTS - EVALUATION		
Unitary Cost (€/kg CO_2)	**0.047€/ $kg_{CO2\ annual\ saving}$**	**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= 20*3*0.3*3*1000kWh/year= 54.000 kWh/year

Measure ESAC2: Organization of annual seminar on Energy Saving

The organization of an annual seminar on Energy Saving in Ergates Community 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	**2.000 €**	
Indirect Cost	☐ **– High** ☒ **– Average** ☐ **– Low**	
APPLICATION BENEFITS		
Energy Financial (Energy saving. €/year) Environmental (kg CO_2-eq)	**31.500 kWh/year** The financial benefits for interested parties **20.283 kg_{CO2}/year**	
RESULTS - EVALUATION		
Unitary Cost (€/kg CO_2)	**0,10€/ $kg_{CO2\ annual\ saving}$**	**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= 20*3*0.25*3*700kWh/year= 31.500 kWh/year

Measure ESAC3: Organization of educational presentations to students

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

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

Measure implementation period: 2010

Measure Code	**ESAC 3**	
Measure Name	**Organization of educational presentations to students**	
APPLICATION COST		
Cost of Measure	**1.200 €**	
Indirect Cost	☒ **– High** ☐ **– Average** ☐ **– Low**	
APPLICATION BENEFITS		
Energy Financial (Energy saving. €/year) Environmental (kg CO_2-eq)	**504.000 kWh/year** The financial benefits for interested parties **357.336kg$_{CO2}$/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 person (kWh)
Calculation: ES= 350*1,5*0.4*3*800kWh/year= 504.000 kWh/year

Measure ESAC4: Organization of "Day without lighting"

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

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

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

Measure Code	**ESAC 4**	
Measure Name	**Organization of "Day without lighting"**	
APPLICATION COST		
Cost of Measure	**1000 €**	
Indirect Cost	☒ **– High** ☐ **– Average** ☐ **– Low**	
APPLICATION BENEFITS		
Energy Financial (Energy saving. €/year) Environmental (kg CO_2-eq)	**230.400 kWh/year** The financial benefits for interested parties **201.370kg$_{CO2}$/year**	
RESULTS - EVALUATION		
Unitary Cost (€/kg CO_2)	**0.005/ kg$_{CO2\ annual\ saving}$**	**Proposed for Implementation** ☒

Equation: $ES=v*\varepsilon*n*v\delta*ESPP$
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= 400*8*0.20*3*120kWh/year= 230.400 kWh/year

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

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

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

Start of Implementation: 2012

Measure Code	**ESAC 5**	
Measure Name	**Energy Information in the Municipality website and e-newsletter**	
APPLICATION COST		
Cost of Measure	**0 €**	
Indirect Cost	☒ **– High** ☐ **– Average** ☐ **– Low**	
APPLICATION BENEFITS		
Energy Financial (Energy saving. €/year) Environmental (kg CO_2-eq)	**819.000 kWh/year** The financial benefits for interested parties **580.671 kg_{CO2}/year**	
RESULTS - EVALUATION		
Unitary Cost (€/kg CO_2)	**0.00 €/ $kg_{CO2\ annual\ saving}$**	**Proposed for Implementation** ☒

Equation: $ES=v*\varepsilon*n*v\delta*ESPP$
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=500*8*0.15*3*455kWh/year=819.000 kWh/year

Measure ESAC6: Organization of "Cycling Day"

The organization of an annual "Cycling Day" in Ergates Community was examined. The measure will apply for 8 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 6**	
Measure Name	**Organization of "Cycling Day"**	
APPLICATION COST		
Cost of Measure	**1000 €**	
Indirect Cost	☐ **– High** ☐ **– Average** ☒ **– Low**	
APPLICATION BENEFITS		
Energy Financial (Energy saving. €/year) Environmental (kg CO_2-eq)	**174.069 kWh/year** The financial benefits for interested parties in terms of fuel saving **44.039 kg_{CO2}/year**	
RESULTS - EVALUATION		
Unitary Cost (€/kg CO_2)	**0.009€/ $kg_{CO2\ annual\ saving}$**	**Proposed for Implementation** ☒

Equation: $ES=v*\varepsilon*n*v\delta*ESPP$
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= 30*7*0.3*3*921kWh/year= 174.069 kWh/year

Measure ESAC7: Organization of "Eco-cars Day"

The organization of "Eco-cars Day" in Ergates Community was examined. The measure will be held annually for 8 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.

Implementation year start: 2012

Measure Code	**ESAC7**	
Measure Name	**Organization of "Eco-cars Day"**	
APPLICATION COST		
Cost of Measure	**1600 €**	
Indirect Cost	☐ **– High** ☒ **– Average** ☐ **– Low**	
APPLICATION BENEFITS		
Energy Financial (Saving en. €/year) Environmental (kg CO_2-eq)	**442.080 kWh/year** The financial benefits for interested parties in terms of fuel saving **111.846 kg_{CO2}/year**	
RESULTS - EVALUATION		
Unit 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
Calculation: ES= 40*8*0.05*3*9210kWh/year= 442.080 kWh/year

Measure ESAC8: 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 8**			
Measure Name	**Informational leaflets and messages**			
APPLICATION COST				
Measure Cost	**Total (€)**			
(a) Leaflets on RES and ES	**3.000 €**			
(b) Leaflets on sustainable mobility	**1.000 €**			
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	2.400	15%	2210	**795.600**
(b) Leaflets on sustainable mobility	1.000	15%	2210	**331.500**
Financial				
	The financial benefits for interested parties in terms of energy saving			
Environmental	**Emissions Saving (kg_{CO2}/ year)**			
(a) Leaflets on RES and ES	564.080			
(b) Leaflets on sustainable mobility	83.870			
RESULTS - EVALUATION				
Unitary Cost (€/kg CO_2)			**Proposed for Implementation**	
(a) Leaflets on RES and ES	**0.005 €/ $kg_{CO2\ annual\ saving}$**		☒	
(b) Leaflets on sustainable mobility	**0.012€/ $kg_{CO2\ annual\ saving}$**		☒	
DELIVERABLE				
Total Cost **4.000 €**		**Emission Reduction** **647.950 Kg_{CO2}/ year**		

Measure ESAC9: Organization of an annual seminar on Energy Saving in Industry

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

Considered to promote cogeneration systems.

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 at home on their own.

Implementation years 2013, 2015, 2017

Measure Code	**ESAC9**	
Measure Name	**Organization of annual seminar on Energy Saving in Industry**	
APPLICATION COST		
Cost of measure	**1.500 €**	
Indirect cost	☐ **– High** ☒ **– Average** ☐ – Low	
APPLICATION BENEFITS		
Energy Financial (Saving en. €/year) Environmental (kg CO_2-eq)	**324.000 kWh/year** The financial benefits for interested parties **238.140 kg_{CO2}/year**	
APPLICATION BENEFITS		
Unit cost (€/kg CO_2)	**0.006€/ $kg_{CO2\ annual\ saving}$**	**Proposed for Implementation** ☒

Σχέση: 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= 15*3*0.8*1.5*6000kWh/year= 324.000 kWh/year

7.4. Energy saving in Transport

Measure: EST1 – Energy saving in the Community fleet

The possibility of purchase one vehicle with low CO2 emissions was examined. The purchase cost of the measure application is not particularly important, as the following requirements must first be fulfilled: (a) preparation of the call for tenders (b) Evaluation of offers against specific technical and financial criteria of low emissions cars which is sponsored by the Scheme of the Ministry of Commerce, Industry and Tourism. 700 € for low emissions vehicle and 1200€ for a hybrid.

Year of implementation: 2014

Measure Code	**EST1**	
Measure Name	**Energy saving in the Community fleet**	
APPLICATION COST		
Measure Cost	**Total (€)**	
Purchase of 1 eco cars	**15.000 €**	
Indirect Cost		
	☐ **– High** ☐ **– Medium** ☒ **– Low**	
APPLICATION BENEFIT		
Energy	**Energy Saving (kWh/year)**	
Purchase of 1 eco cars	**9.210**	
Financial	**Saving (€/year)**	
Purchase of 1 eco cars	**1000**	
Environment	**Emission Saving (kg_{CO2}/ year)**	
Purchase Of 1 eco cars	**2.330**	
ΑΠΟRESULTS-EVALUATION		
Unit Cost €/$kgCO_2$		**Proposed for Implementation**
Purchase of 1eco cars	**6.44 €/ $kg_{CO2\ annual\ saving}$**	☒
MEASURE TO IMPLEMENT		
Total Cost **15.000 €**	**Emissions Reduction** **2.330 Kg_{CO2}/ year**	

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

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

The indirect cost of the measure can be considered limited.

Measure Code	**EST 2**			
Measure Name	**New Cycle Path Network**			
APPLICATION COST				
Cost of measure	**Total (€)**			
New Cycle Path Network	**60.000 €**			
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)**
New Cycle Path Network	4	20.000	20	**1.600.000**
Financial				
	The financial benefits for interested parties from fuel saving			
Environmental	**Emissions Saving (kg_{CO2}/ year)**			
New Cycle Path Network	**404.800**			
RESULTS - EVALUATION				
Unitary Cost (€/kg CO_2)			**Proposed for implementation**	
New Cycle Path Network	**0.15 €/ $kg_{CO2\ annual\ saving}$**		☒	
DELIVERABLE				
Total Cost **60.000 €**		**Emissions Reduction** **404.800Kg_{CO2}/ year**		

7.5. Energy saving in street lighting

Measure: ESSL1 – Energy saving in street lighting

The possibility of saving energy in street lighting was examined. The street lighting is one of the major costs of the Community. The electricity consumption of the street lighting in Ergates Community in 2009 was 147 MWh.

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

The indirect application cost can be considered low.

Year of Measure Implementation: 2013

Measure Code	**ESSL1**			
Measure Name	**Energy saving in street lighting**			
APPLICATION COST				
(a) Lamp replacement with LED	**Total (€)**			
(b) Optimization of street lighting function	**100.000 €**			
Indirect Cost	**2.000 €**			
Maintenance Cost	☐ **– High** ☐ **–Medium** ☒ **– Low**			
	☐ **– High** ☐ **–Medium** ☒ **– Low**			
APPLICATION BENEFIT				
Energy	Number	Electricity Consumption per lamp (kWh/year)	ES per lamp per year (%)	**EnergySaving (kWh/year)**
(a) Lamp replacement with LED	200	800	50	**80.000**
(b) Optimization of street lighting function	200	800	5	**8.000**
Financial	EnergySaving (kWh/year)	Average price of electricity (€/kWh)	**Saving (€/year)**	
(a) Lamp replacement with LED	80.000	0.25	**20.000**	
(b) Optimization of street lighting function	8.000	0.25	**2.000**	
Environmental	**Emissions Saving (kg_{CO2}/ year)**			
(a) Lamp replacement with LED	**17.480**			
(b) Optimization of street lighting function	**1.748**			
RESULTS - -EVALUATION				

Unit Cost (€/kg CO_2)			Proposed for Implementation
(a) Lamp replacement with LED	**5,72 €/ $kg_{CO2\ annual\ saving}$**		☒
(b) Optimization of street lighting function	**1,144 €/ $kg_{CO2\ annual\ saving}$**		☒
MEASURE TO IMPLEMENT ESSL			
Total cost **102.000 €**	**Saving** **22.000€**	**Emissions Reduction** **19.228 Kg_{CO2}/ year**	**Repayment** **4.63 years**

7.6. Development of green spaces in Ergates Community

Measure: DGS1 – Development of green spaces in Ergates

Was examined: (a) trees planting, (b) care of green spaces

The indirect cost of the measure application can be considered limited

Measure Code	**DGS1**	
Measure Name	**Development of green space in Ergates Community**	
APPLICATION COST		
Measure Cost	**Total (€)**	
(a) Tree Planting (2000 trees)	**1000 €**	
(b) Care of green spaces	**1000 €**	
Indirect Cost		
	☐ **– High** ☐ **– Medium** ☒ **– Low**	
APPLICATION BENEFIT		
Environmental	**Emissions Saving (kg_{CO2}/ year)**	
(a) Tree Planting (2000 trees)	**40.000**	
(b) Care of green spaces	**20.000**	
RESULTS - -EVALUATION		
Unit Cost (€/kg CO_2)		**Proposed for Implementation**
(a) Tree Planting (2000 trees)	**0.04 €/ $kg_{CO2\ annual\ saving}$**	☒
(b) Care of green spaces	**0.10 €/ $kg_{CO2\ annual\ saving}$**	☒
ΜΕΤΡΟ ΠΡΟΣ ΥΛΟΠΟΙΗΣΗ ΕΕΠ11(α),(β) Προώθηση αυτοκινήτων με χαμηλές εκπομπές CO_2		
Total Cost **2.000 €**	**Emissions Reduction** **50.000 Kg_{CO2}/ year**	

7.7. Summary of proposed measures at Ergates Community

Table 18 Brief Presentation of Measures Taken by Ergates Community and Included in the Sustainable Energy Action Plan

Measure / Action	Application	Cost (€)	Emissions Reduction (Kg_{CO2}/ year)	Depreciation /Repayment
Energy Saving in public buildings				
EE1 - Interventions of insulation	2012	150	1.005	0,52 χρόνια
EE2 - Maintenance of heating and air conditioning	2012-2020	200	1.458	0,4 χρόνια
EE3 - -Renewable electricity with PV in the building or in the parking lot of the Community	2013-2016	50.000	23.660	6,67 χρόνια
Energy Saving through awareness raising campaigns				
ESAC1 - Organizing an annual seminar on Renewable Energy Sources	2013-2015	2.000	42.606	-
ESAC2 - Organizing an annual seminar on energy saving	2013-2015	2.000	20.283	-
ESAC3 - Organization of educational presentations to students	2013-2020	600	204.192	-
ESAC4: Organizing day without lighting	2012-2020	1.000	201.370	-
ESAC5: Information on energy in the Community website	2012-2020	0	580.671	-
ESAC6: Organizing of mobility day	2013-2020	1.000	44.039	-
ESAC7: Information sensitization with documents	2012-2020	1.600	111.846	-
ESAC8: Organizing eco-driving seminar	2012-2020	4.000	647.950	
ESAC 9 – Organization of an annual seminar on Energy Saving in Industries	2013-2015	1.500	238.140	
Saving energy in transports				

EST 1: Saving energy in the Community fleet	2014	15.000	2.330	-
EST2: Energy Saving in Transport by New Cycle Path Network in Ergates	2014-2020	60.000	404.800	-
Energy savings in street lighting				
ESSL 1: Energy saving in street lighting	2013	102.000	19.228	4,63 χρόνια
Development of green spaces				
Development of green spaces in Ergates	2012-2020	2.000	60.000	-
TOTAL		**243.050**	**2.603.578**	

7.8. Contribution of National Measures on Sustainable Energy Action Plan of Ergates Community

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

Table 19 Total presentation of energy saving from national measures

NATIONAL MEASURES FOR ENERGY EFFICIENCY		Energy Saving (MWh/year)			
		Residential	Tertiary	Industrial	Residential
1	Legislation on Energy Building Performance (Equation 1)	88	15	260	0
2	Legislation for the inspection of air conditioning and heating systems (Equation 1)	42	7	125	0
3	Grant Schemes for the installation of solar thermal systems (Equation 1)	15	2	44	0
4	Grant Schemes for the installation of geothermal systems (Equation 1)	11	2	31	0
5	Legislation on energy efficiency of appliances (Equation 1)	63	14	270	0
6	Grant Schemes for the installation of Photovoltaics Systems (Equation 2)	76	63	127	0
7	Legislation for mandatory integration of solar water heaters (Equation 1)	8	2	32	0
8	Grant Schemes for thermal insulation of buildings	0	15	104	0
9	Grant Schemes for cogeneration in Industry (Equation 1)	0	0	593	0
10	Plan of single urban transport system (Equation 3)	0	0	0	2.248
11	Mandatory inspection of Vehicles MOT (Equation 3)	0	0	0	1.482
12	Withdrawal Plan of old vehicles (Equation 3)	0	0	0	356
13	Grant Schemes for hybrid vehicles and vehicles with low CO2 emissions (Equation 3)	0	0	0	190
14	Discounts on vehicles registration for vehicles with low CO2 emissions (Equation 3)	0	0	0	237
	TOTAL PER SECTOR	302	119	1.586	4.512
	TOTAL	6.519			

Table 20 Total presentation of reducing CO2 emissions from national measures

	NATIONAL MEASURES FOR ENERGY	Emission Reduction (tCO_2/year)			
		Residential	Tertiary	Industrial	Transport
1	Legislation on Energy Building Performance (Equation 1)	62	11	190	0
2	Legislation for the inspection of air conditioning and heating systems (Equation 1) (Σχέση 1)	30	5	91	0
3	Grant Schemes for the installation of solar thermal systems (Equation 1)	10	2	32	0
4	Grant Schemes for the installation of geothermal systems (Equation 1)	7	1	23	0
5	Legislation on energy efficiency of appliances (Equation 1)	44	10	197	0
6	Grant Schemes for the installation of Photovoltaics Systems (Equation 2)	54	47	93	0
7	Legislation for mandatory integration of solar water heaters (Equation 1)	6	1	23	0
8	Legislation on energy efficiency of existing buildings with an area grater than 1000m^2 (Equation 1)	0	11	76	0
9	Grant Schemes for cogeneration in Industry (Equation 1)	0	0	432	0
10	Plan of single urban transport system (Equation 3)	0	0	0	568
11	Mandatory inspection of Vehicles MOT (Equation 3)	0	0	0	374
12	Withdrawal Plan of old vehicles (Equation 3)	0	0	0	90
13	Grant Schemes for hybrid vehicles and vehicles with low CO2 emissions (Equation 3)	0	0	0	48
14	Discounts on vehicles registration for vehicles with low CO2 emissions (Equation 3)	0	0	0	60
	TOTAL PER SECTION	215	88	1.156	1.140
	TOTAL	2.598			

Table 21 Equations used for access contribution of the national measures to save energy

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

(2) GE=N*P*np
GE: Green Energy (MWh) N: Population P: Production per application (MWh) np: Number of participation (0-100%)

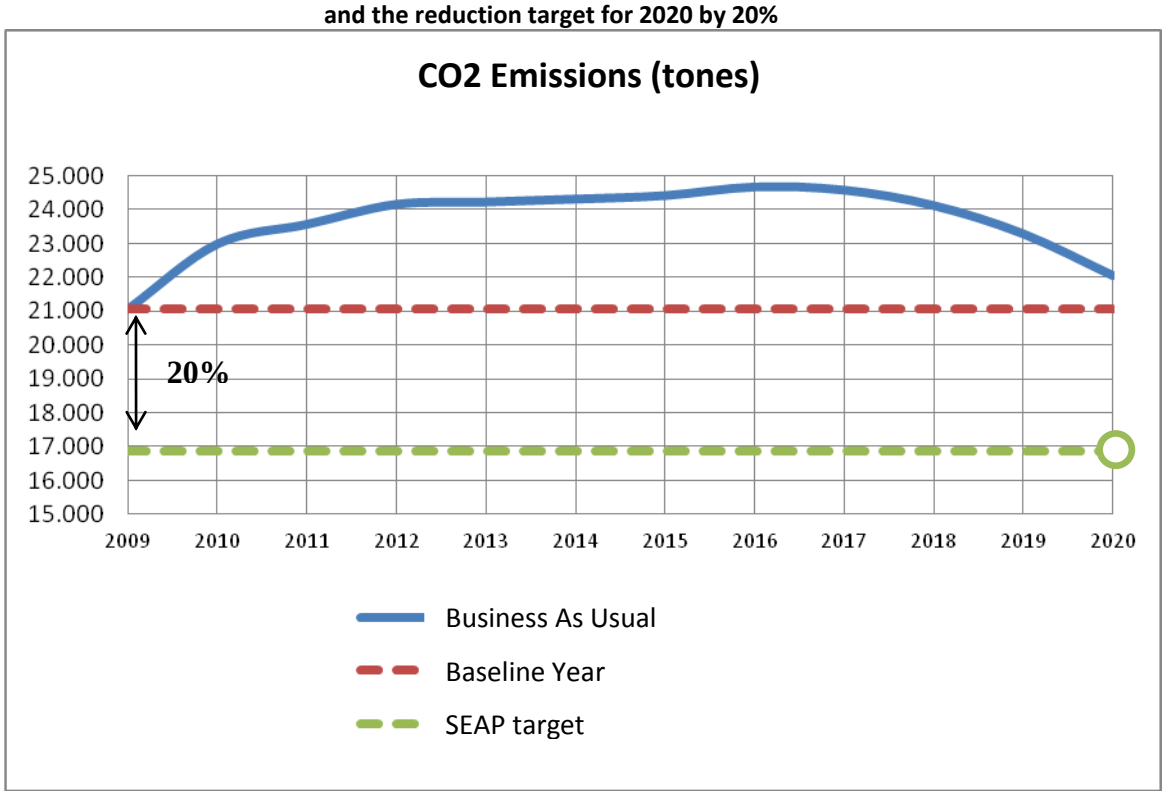
(3) EOS=(N*FO*np)+(ΔO*FO*np)
EOS: Energy Saving from fuel MWh) N: Population FO: Saving Energy per person (MWh) np: Number of participation (0-100%) ΔO: Passing Vehicles

7.9. Description of achieving emission reduction of CO2 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. Achieving this objective is presented in the table below.

Emission inventory for reference year 2009 (tnCO_2/year)	21.077
Expected emissions for 2020 – Expected Development Scenario (tn CO_2/year)	22.064
Estimated emission reduction from national measures for 2020 (tn CO_2/year)	2.598
Estimated emission reduction by the Municipality for 2020 (tn CO_2/year)	2.604
Total estimated emission reductions for 2020 (tn CO_2/year)	5.202
Estimated emissions for 2020 of the Action (tn CO_2/year)	**16.862**
Emission reduction percentage by 2020 compared with 2009	**20%**

Picture 31 Schematic of the Expected Evolution Scenario of CO2 emissions in Ergates Community and the reduction target for 2020 by 20%



Therefore the implementation of Energy Action Plan, the Community of Ergates will reduce carbon dioxide emissions by 20% compared to 2009 (reaching 16.862 tons of CO_2)

7.10.Financing Sustainable Energy Action Plan

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

- Municipality budget
- Savings that will result from energy reduction measures in buildings, vehicles and street lighting in the Municipality
- Incomes form the investments of the Municipality in Renewable Energy Sources
- Funding from the Grant Scheme of Ministry of Commerce, Industry and Tourism for Renewable Energy Sources and Energy Saving promotion.
- Possible funding from the structural funds.
- Possible funding from the Fund created by the Tender incomes og greenhouse gas emissions.
- Possible funding from other European Programmes.

Sources of energy data

- Fuel/heating fuel consumption from oil companies within the administrative limits of Ergates Community.

- LPG consumption from the Statistical Service of Cyprus (Reduction at local level based on the population) [www.mof.gov.cy/cysta]

- Annual growth rates from the Statistical Service of Cyprus and estimates of scholars [www.mof.gov.cy/cysta]

- National Action Plan for reducing CO_2 emissions from the Department of Environment [http://www.cyprus.gov.cy/moa/agriculture.nsf]

- National Action Plans for the share of RES from the Energy Service. [http://www.mcit.gov.cy/mcit/mcit.nsf]

- National Action Plan for Energy Efficiency from the Energy Service. [http://www.mcit.gov.cy/mcit/mcit.nsf]

- Grant Schemes for RES and ES from the Energy Service

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

- Development of Public transport Plans from the Department of Road Transport [www.mcw.gov.cy/mcw/rtd/rtd.nsf]

- Electricity Consumption data in the Municipality from the Electricity Authority of Cyprus [www.eac.com.cy]

- Energy consumption data in community buildings from the Ergates Community

- 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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