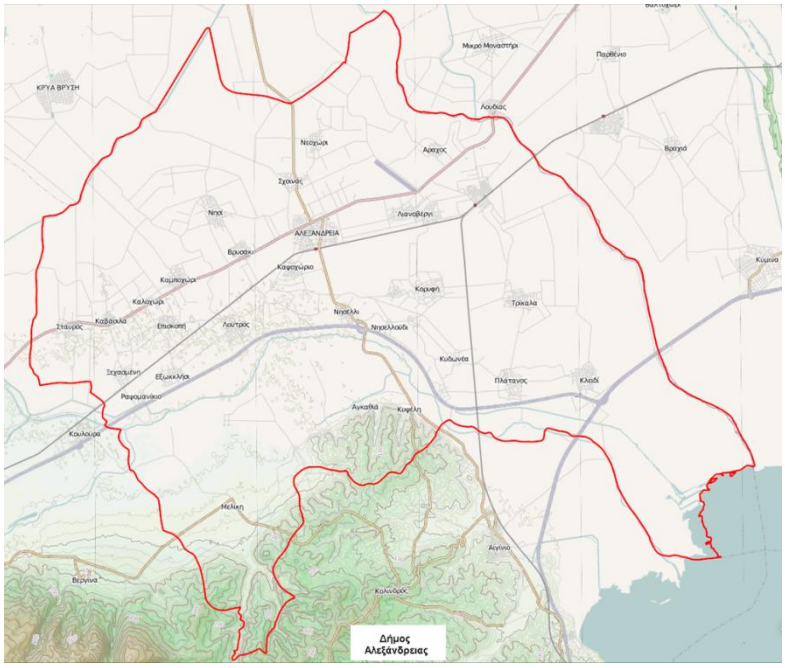
ΔΗΜΟΣ ΑΛΕΞΑΝΔΡΕΙΑΣ

Sustainable Energy Action Plan (SEAP)
of Municipality of Alexandria



In the context of the urban climate and energy initiative
"Covenant of Mayors"

Basic Geographic and Administrative Aspects

The area of Alexandria Municipality covers the eastern part of Imathia prefecture; the Thessaloniki prefecture is at its east border, Pella prefecture is at its north border and Pieria Prefecture is at its south border. The capital is the city of Alexandria.

The geographical position of the Municipality of Alexandria, both in Imathia and in general, in the national territory, is particularly important as Via Egnatia, the Aegean Motorway (PATHE) and the rail cross the region.

The municipality of Alexandria will use the SEAP for :
- Saving energy
- Applying new technologies
- The use of RES (renewable energy resources) and the potential energy
- The use the applied energy measures as demonstration projects for the region
- To raise public awareness on energy saving and
- To improve the "energy" behavior of municipal employees
- To change the "energy" behavior of inhabitants in general

The Municipality of Alexandria action areas focused on the categories:
1. Municipal buildings, facilities, equipment
2. Local Electricity production
3. Transportation - Municipal fleet
4. Cooperation with citizens and stakeholders
5. Investigation exploitation opportunities of renewable energy potential
6. Feasibility study of gas distribution network in the city of Plati and / or Alexandria

Organizational and Financial Aspects

For the implementation of the SEAP, the internal support structures will be enforced, which will coordinate, monitor and support the implementation of the SEAP.
In this context, the energy agency of the Municipality will be set up, and will be the organizational unit that has the coordination and responsibility for monitoring the implementation of the SEAP. Particularly important is the role of the Energy Agency for the submission of energy projects in relevant funding programs. It will also investigate the use of project funding through Energy Service Companies (ESCOs) and PPPs.
Alongside the energy agency will provide information to citizens and businesses in matters relating to energy saving and energy management systems, use of RES for financing tools and will organize awareness-raising of the local community for changing behavior in relation to energy consumption.

Allocated Staff

The elaboration of the SEAP conducted by electrical engineer Anna Fragkidou following the guidelines and procedures of the initiative "Covenant of Mayors". The development was done in collaboration with the Planning Department and the Technical Department of the Municipality, while meetings with executives of all relevant business areas of the municipality.

Involvement of stakeholders and citizens

The Mayor of Alexandria Municipality is committed to fully support the SEAP. The council supports and enhances all its actions. SEAP's key elements are already included in the Municipality's Operational Program, published in November 2011.
The citizens will be informed with information material that will be posted on the Municipality's web page. The awareness of citizens and stakeholders will be achieved with relevant events throughout the course of implementation. Residents, businesses and industries located in the area will be informed about their energy savings targets at local level.
The participation of citizens in activities is very essential, that is the reason why the first awareness event will be at the beginning of the SEAP.
Finally, the annual reports and relevant information on energy issues will be posted on a link on the Municipality's website.

Baseline Emissions Inventory (BEI)

Inventory year : **2011** (year of last official data of Hellenic Statistical Authority)
Population : 41.570 inhabitants (2011)
Area : 478,825Km^2, mainly agricultural area,

Emission factors

Please tick the corresponding box:

- ☑ Standard emission factors in line with the IPCC principles
- ☐ LCA (Life Cycle Assessment) factors

Emission reporting unit

Please tick the corresponding box:

- ☑ CO2 emissions
- ☐ CO2 equivalent emissions

The CO_2 emissions factors that were used in the Baseline Emissions Inventory (BEI) are the following :

Fuel type	CO_2 emissions factor (t CO_2/MWh)
Diesel	0,267
Motor Gazoline	0,249
LPG	0,227
Natural Gas	0,202
Kerosene	0,257
Country	**National CO_2 emissions factor (t CO_2/MWh)**
Greece	1,149
Transportation fuels	**Conversion factor (kWh/l)**
Gasoline	9.2
Diesel	10

BEI - Municipal Buildings

Electricity consumption of school buildings	2011	2012	2013	2014
Alexandria Municipal section	160.22	163.67	165.01	174.13
Plati Municipal section	190.37	203.47	236.38	225.02
Meliki Municipal section	165.97	169.51	161.83	175.38
Antigonides Municipal section	79.79	83.46	90.38	88.37
Total (MWh)	596.36	620.11	653.59	662.90

Electricity consumption of rest municipal buildings	2011	2012	2013	2014
Alexandria Municipal section	48.24	49.56	59.82	159.59
Plati Municipal section	181.18	170.80	175.62	179.07
Meliki Municipal section	173.68	184.47	188.04	144.20
Antigonides Municipal section	17.21	15.11	20.23	21.91
Total (MWh)	420.30	419.94	443.70	504.77

Total energy consumption of municipal buildings : **1.004,7 MWh_{el}** and **5.146 MWh_{th}**

BEI - Municipal Equipment / facilities

Electricity consumption of Water Supply & Sewerage Facilities	2011	2012	2013	2014
Total (MWh)	1,653.70	1,914.73	1,654.46	1,925.53

Electricity consumption of Irrigation Facilities	2011	2012	2013	2014
Total (MWh)	1,668.91	1,605.37	2,176.76	1,931.03

Electricity consumption of Public Lighting	2010	2011	2012	2013	2014
Total (MWh)	4,182	4,075	4,255	4,247	4,303

BEI - Tertiary (non municipal buildings) Equipment / facilities

Total energy consumption of tertiary sector : **30.621,1 MWh_{el}** and **2.318,3 MWh_{th}**

BEI - Residential Sector

	Energy Consumption (MWh)	Emmissions CO_2 (tn)
Electricity	57.348,8	65.893,8
Thermal Energy	200.845,2	33.848,7
TOTAL	258.193,28	99.742,5

BEI - Transport

Total number for each type of vehicles of Municipality of Alexandria (years 2011-2014)	2011	2012	2013	2014	tn CO_2
Cars	15.674	15.555	15.382	15.296	29,739
Motorcycles	3.081	3.101	3.115	3.146	
Trucks	7.594	7.593	7.588	7.59	37,707
Buses	66	65	66	65	
Total	26.415	26.314	26.151	26.097	67,446

Energy consumption by fuel type of municipal fleet in 2011 (MWh)	2011		
	lt	MWh	tn CO_2
Gazoline	28,426.0	261.5	65.1
Diesel	137,055.0	1,370.6	365.9
Biosiesel	9,528.0	95.3	0.0
Total	**175,009.0**	**1,727.4**	**431.0**

Urban road and Interurban Transportation	2011	
	MWh	tn CO_2
	1,372.6	342.7

private-commercial transport	2011	
	MWh	tn CO_2
	265.217,1	66.672,2

Fuel	Total		private-commercial transport		municipal fleet		Urban road and Interurban	
	tn CO_2	MWh	tn CO_2	MWh	tn CO_2	MWh	tn CO_2	MWh
LPG	1,447.7	6,377.6	1,447.7	6,377.6				
Gazoline	28,193.5	113,226.7	28,128.4	112,965.2	65.1	261.5		
DIESEL	37,706.8	141,224.2	36,998.2	138,570.2	365.9	1,370.5	342.7	1,283.4
Natural Gas	98.1	485.6	98.1	485.6				
Biodiesel	0.0	7,003.4	0.0	6,820.9	0.0	95.3		87.2
Total	**67,446.1**	**268,317.5**	**66,672.4**	**265,219.5**	**431.0**	**1,727.3**	**342.7**	**1,370.6**

BEI - RES

Up to 2011	Installed power (MW)	Annual Electricity Production (MWh)	CO_2 enmissions avoidance (tn)
PV installations	3.8	5,257.0	6,040.3
CHP	5.2	31,978.4	36,743.2
Total	**9.0**	**37,235.4**	**42,783.5**

BEI - Final Energy Consumption

Category	FINAL ENERGY CONSUMPTION [MWh]										
		Fossil fuels									
	Electricity	Natural gas	Liquid gas	Heating Oil	Diesel	Gasoline	Other fossil fuels	Biofuel	Other biomass	Solar thermal	Total
BUILDINGS, EQUIPMENT/FACILITIES AND INDUSTRIE											
Municipal buildings, equipment/facilities	4327.3			5146							9473.3
Tertiary (non municipal) buildings, equipment/facilities	30621.1		208.7	1924.2							32754
Residential buildings	57348		16043.8	110063.2			569.4		72128.1	2040.6	258193.1
Municipal public lighting	4075										4075
Industries (excluding industries involved in the EU Emission trading scheme - ETS)											0
Subtotal buildings, equipments/facilities and industries	96371.4	0	16252.5	117133.4	0	0	569.4	0	72128.1	2040.6	304495.4
TRANSPORT:											
Municipal fleet					1370.5	261.5		95.3			1727.3
Public transport					1283.4			89.22			1372.62
Private and commercial transport		485.6	6377.6		138570.2	112965.2		6820.9			265219.5
Subtotal transport	0	485.6	6377.6	0	141224.1	113226.7	0	7005.42	0	0	268319.4
Total	**96371.4**	**485.6**	**22630.1**	**117133.4**	**141224.1**	**113226.7**	**569.4**	**7005.42**	**72128.1**	**2040.6**	**572814.8**

BEI - CO_2 Emissions

Category	CO2 emissions [t]/ CO2 equivalent emissions [t]								Total
	Electricity	Heat/cold						RES	
		Natural gas	Liquid gas	Heating Oil	Diesel	Gasoline	Other fossil fuels		
BUILDINGS, EQUIPMENT/FACILITIES AND INDUSTRIES:									
Municipal buildings, equipment/facilities	4972.1		0	1374.0					6346.0
Tertiary (non municipal) buildings, equipement/facilities	35183.6		47.4	513.8					35744.8
Residential buildings	65892.9		3641.9	29386.9			146.3		99068.0
Municipal public lighting	4682.2								4682.2
Industries (excluding industries involved in the EU Emission trading scheme - ETS)									
Subtotal buildings, equipments/facilities and industries	110730.7	0	3689.3	31274.6	0	0	146.3	0	145841.0
TRANSPORT:									
Municipal fleet					365.9	65.1			431.0
Public transport					342.7				342.7
Private and commercial transport		98	1447.7		36998.2	28128.33			66672.4
Subtotal transport	0	98.0912	1447.715	0	37706.8	28193.45	0	0.0	67446.09
Total	**110730.74**	**98.0912**	**5137.033**	**31274.62**	**37706.83**	**28193.45**	**146.3358**	**0.0**	**213287.1**

BEI - Local electricity production and corresponding CO_2 emissions

Locally generated electricity (excluding ETS plants , and all plants/units > 20 MW)	Locally generated electricity [MWh]	CO_2 / CO_2-eq emissions [t]	Corresponding CO_2-emission factors for electricity production in [t/MWh]
Wind power			
Hydroelectric power			
Photovoltaic	5257	6040.3	1.149
Combined Heat and Power	31978.4	36743.2	1.149
Total	**37235.4**	**42783.5**	

Sustainable Energy Action Plan – Sectors and fields of action

BUILDINGS, EQUIPMENT/FACILITIES AND INDUSTRIES:

SEAP – Municipal Buildings, equipment and facilities

	Measure	Implementation period	Budget (€)	Expected energy saving (MWh/y)	Expected RES production (MWh/y)	Expected CO_2 reduction (tn/y)
1	Interventions in primary and secondary schools' lighting system	2016-2020	It cannot be estimated since there are no relevant studies	134.8		154.8
2	Interventions in the building envelope and heat production system of schools			454.1		121.2
3	Interventions in rest municipal buildings' lighting system,			31.9		36.6
4	Interventions in the building envelope and heat production system of rest municipal buildings,			21.3		5.7
5	Implementation of energy saving measures in national energy saving program "SAVING ENERGY in Municipalities"		457,035	385.5		211.6
6	Energy Interventions in sports centers		2,067,800		839	411
7	Energy exploitation of waste cooking oil		160,000		112.4	87.5
8	Planting Trees		40,000	89		105.2
9	Investigating development of energy applications opportunities		90,000			

SEAP – Tertiary (non municipal buildings) Equipment / facilities

	Measure	Implementation period	Budget (€)	Expected energy saving (MWh/y)	Expected CO_2 reduction (tn/y)
1	Energy upgrade of business use buildings under national programme	2016-2020	It cannot be estimated since there are no relevant studies	1,515	1.422
2	Energy upgrade of business use buildings with Energy Performance Contracting			2,271	2.131,
3	Staff education and training actions of tertiary sector employees,			2,861	2.685
4	Energyupgrade of business use buildings by the owners themselves			9,680	11.125

SEAP – Residential buildings

	Measure	Implementation period	Budget (€)	Expected energy saving (MWh/y)	Expected RES production (MWh/y)	Expected CO_2 reduction (tn/y)
1	Lighting system - Lamp replacement	2016-2020	It cannot be estimated since there are no relevant studies	1.468.1	269,5	1.686,9
2	Cooling system - Replacement of energy inefficient air conditioners with new energy-efficient ones, shading facilities			843		968,7
3	Other home appliances - Replacement of energy inefficient ones,			5.789,3		6.651,9
4	Domestic Hot Water - Installation of Solar Panels					309,7
5	Interventions in the building envelope of residential buildings constucted before 1980 - External wall insulation and replacement of			572,9		94,5
6	Mechanical equipment - maintenance replacement of heating system, thermostats			11.244,2,		1.855,3
7	Changing fuel - from diesel to biomass			13.602,3		3.631,8

SEAP – Municipal Public Lighting

	Measure	Implementation period	Budget (€)	Expected energy saving (MWh/y)	Expected CO_2 reduction (tn/y)
1	Energy saving systems that regulate the lighting levels and Replacement of traditional light bulbs with LEDS	2016-2020	It cannot be estimated since there are no relevant studies	222.5	1,404.70

TRANSPORT

SEAP – Municipal fleet

TRANSPORT - Municipal fleet				
	Measure	Implementation period	Budget (€)	Expected CO_2 reduction (tn/y)
1	Municipal fleet drivers training (ECODRIVING) (one every two years)	2012-2020	2,500 €	43,1
2	Fuel replacement to the municipality garbage trucks	2016-2020	4.500€/garbage truck	22,3
3	Supply of electric vehicles and charging them through a PV power plant installation	2015 - 2020	152,600 €	16,5

SEAP – Public Transport

TRANSPORT - Public Transport					
	Measure	Implementation period	Budget (€)	Expected energy saving (MWh/y)	Expected CO_2 reduction (tn/y)
1	Fuel replacement to the public transport buses	2016-2020	6.000€/bus	134.8	41.7

SEAP - Private and commercial transport

TRANSPORT - Private and Commercial Transport				
	Measure	Implementation period	Budget (€)	Expected CO_2 reduction (tn/y)
1	Bike paths	2016-2020	1,723,500.0	666.7
2	Fuel replacement to private cars			1,431.7

SEAP – All the above types of Transport

TRANSPORT - All The above types of Transport			
	Measure	Implementation period	Expected CO_2 reduction (tn/y)
1	Compulsory Replacement of 10% in conventional fuels with biofuels by 2020	up to 2020	4,231

SEAP – Local Electricity Production

Local Electricity Porduction			
Action	Implementation period	Budget (€)	CO_2 enmissions avoidance (tn)
PV - PV installations to the most energy consuming water and sewage pumping stations	2016-2020	1.050.000€	1.429,7
Hydropower - sizing and economic feasibility study for the exploitation of the potential energy in the water tower of the municipal water supply and sewerage company for the construction of small Hydroelectric power stations	2018 - 2020	25.000€ for the study	

SEAP – Public Procurement of products and services

Public Procurement of products and services			
Action	Implementation period	Budget (€)	CO_2 enmissions avoidance (tn)
Green Public Procurement seminars to Procurement Department	2016-2020	2,000.0	149.5

SEAP – Working with Citizens and Stakeholders

Working with Citizens and Stakeholders		
Action	Budget (€)	CO_2 enmissions avoidance (tn)
Energy saving awarness campaigns to municipal employees	2,500 €	50,6
Improvement of citizens' energy behaviour	10,000 €	1.634,3

SEAP – CO_2 reduction target

	Energy saving target [MWh] in 2020	Local renewable energy production target [MWh] in 2020	CO_2 reduction target [t] in 2020	
TOTAL:	60,057.0	2,531.6	**44,817.0**	21%