Sustainable Energy Action Plan

of

Sifnos

Save Energy for Tomorrow

09/2011

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1. INTRODUCTION

The municipality of Sifnos taking into consideration the call of Mayors in Europe to meet and exceed the objective of reducing the emissions of carbon dioxide (CO_2) by 20% by 2020 has developed the Sustainable Energy Action Plan (SEAP). Specifically, the municipality of Sifnos through the implementation of SEAP aims at reducing by 20% its CO2 emissions in 2020 compared to 2001.

The measures planned for the municipality are focused on the building sector, leading to the abovementioned target. Greek islands such as the municipality of Sifnos have many advantages for the implementation of sustainable energy planning, because they usually have a significant potential of renewable energy sources (wind and sun), which remains practically unexploited, whereas energy demand depends highly on imported conventional fuels. In addition, Greek islands have significant tourism related activities – many hotels are open during the summer period only - resulting in high seasonal variations in energy demand. It is important to apply energy saving measures in the building sector (municipal buildings, domestic and tertiary sector) since most of the buildings are with no thermal protection resulting in large amount of energy consumption and thus CO_2 emissions. Due to the special building regulations in the islands regarding the building facades and roofs there are restrictions on the application of renewable energy sources systems such as solar panels and PVs. Taking into account these restrictions and the high energy consumption in the building sector the main interventions refer to the building envelope and building installations for heating and cooling. So the replacement of windows (single glazing with double glazing with high thermal properties and old window frames with new high efficiency) and the installation of external thermal insulation where it is allowed and internal thermal insulation where it is feasible in the non-insulated spaces are the main energy saving measures. Regarding the installations, the old heating systems (boilers and/or heating piping systems) will be replaced with new ones of high efficiency.

The department of environment in the municipality of Sifnos which is involved with environmental issues will be the basis for the development of the Office responsible for the development and implementation of the sustainable energy policy as well as monitor and evaluation of the action plan.

Dissemination and raise awareness activities will take place in several places such as information days in central places (squares, shopping centers) where citizens go often, exhibitions about energy saving and RES technologies and competitions at local schools. Citizens will be also informed by the local press about the national funding opportunities for energy saving measures and RES installations (such as “Energy Saving at Home” and “PVs on roofs”)

2. OVERALL OBJECTIVES

The overall objectives of Sifnos' SEAP are:

- Reduction of electricity and fossil fuel consumption and thus CO_2 emissions in the domestic and tertiary sector
- Reduction of fossil fuel consumption and thus CO_2 emissions in the municipal buildings

3. GREENHOUSE GASES EMISSIONS INVENTORY

3.1 Energy consumption per sector

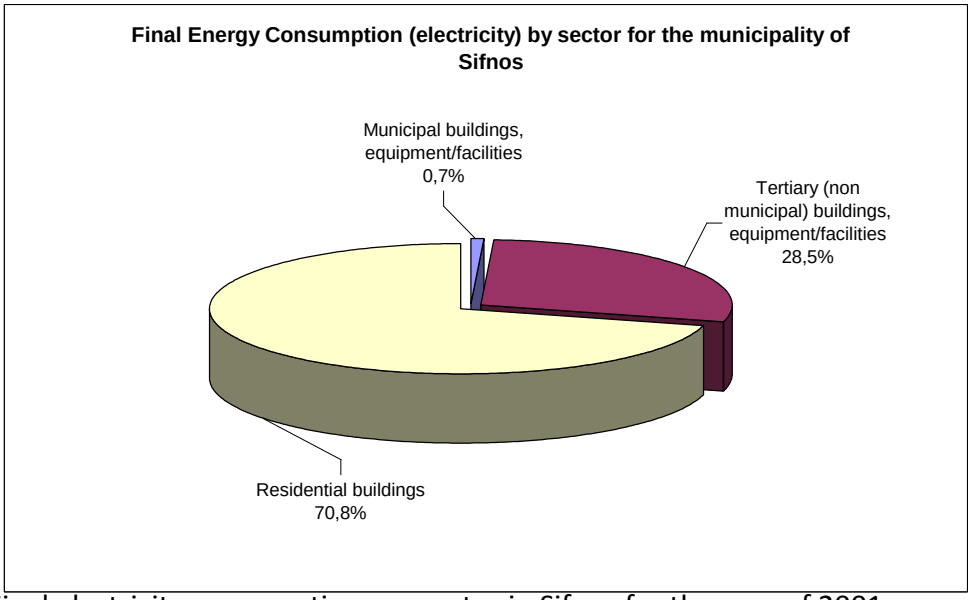

Figure 3.1. Final electricity consumption per sector in Sifnos for the year of 2001

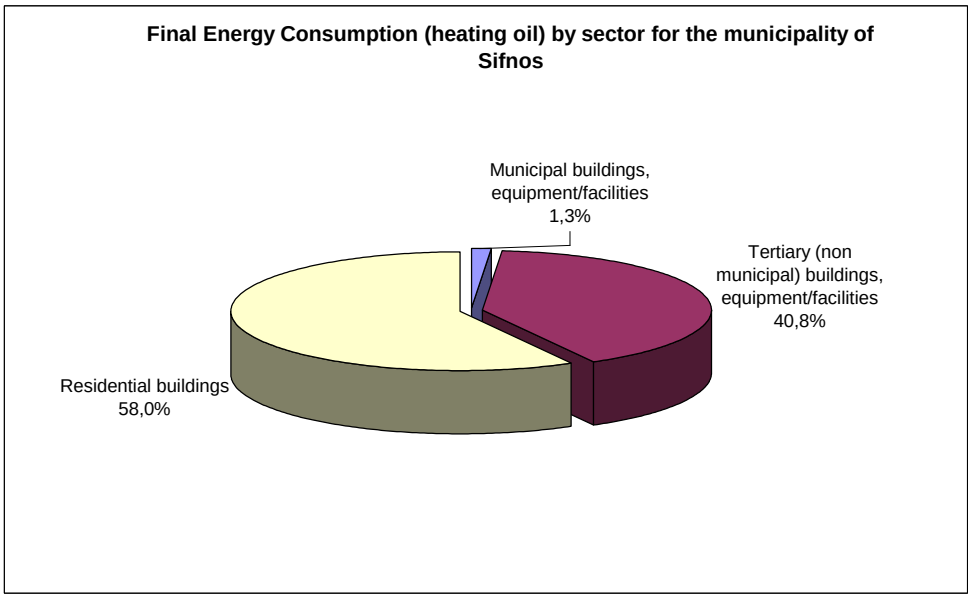

Figure 3.2. Final heating oil consumption per sector in Sifnos for the year of 2001

Table 3.1. Final Energy Consumption by sector and energy source in Sifnos for 2001

Category	Electricity [MWh]	Heating oil [MWh]	Other biomass [MWh]
Municipal buildings, equipment/facilities	92.92	61.95	0
Tertiary (non municipal) buildings, equipment/facilities	3,672.16	1977.32	0
Residential buildings	9,136.27	2811.16	4,216.74
Total	**12,901.35**	**4,850.43**	**4,216.74**

In 2001, the total energy consumption for the building sector is 21,968.5 MWh. The most energy consuming sector is the residential buildings; it occupies 70.8% of the total electricity consumption and 58% of the total heating oil consumption. Due to the use of fireplaces in the residential buildings, this responds in the energy consumption of biomass (wood) of 4,216.74 MWh.

The tertiary sector occupies 28.5% of the total electricity consumption and 40.8% of the total heating oil consumption and the municipal buildings occupy 0.7% of the total electricity consumption and 1.2% of the total heating oil consumption.

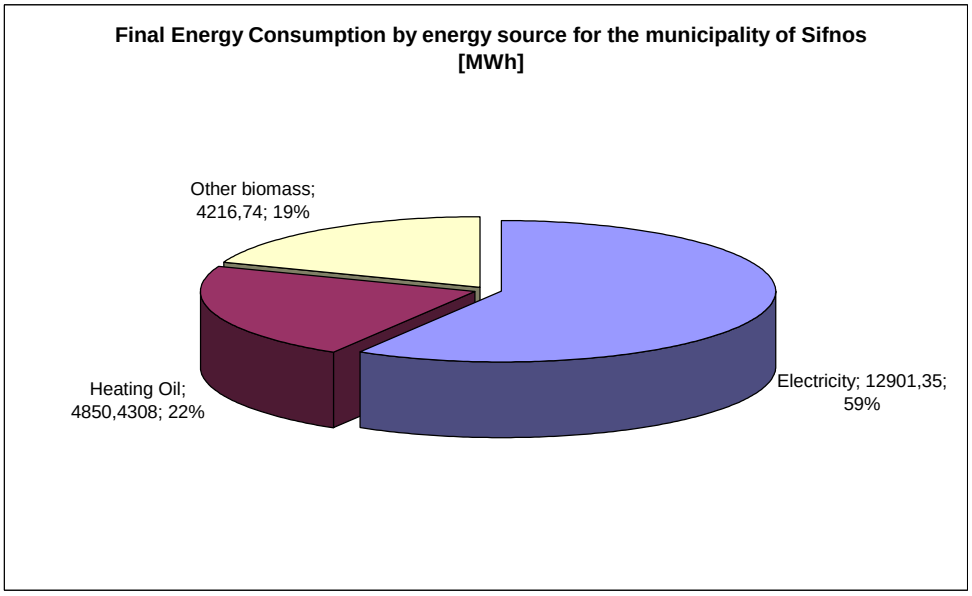

Figure 3.3. Final energy consumption by energy source in Sifnos for the year of 2001

Regarding the distribution of energy sources consumed in the municipality of Sifnos in 2001, electricity (12,901.35MWh) is the most used corresponding to 59% of the total energy consumption, heating oil (4,850.43 MWh) occupies 22% and biomass (wood) (4,216.74 MWh) occupies 19% of the total energy consumption.

3.2 CO_2 emissions per sector

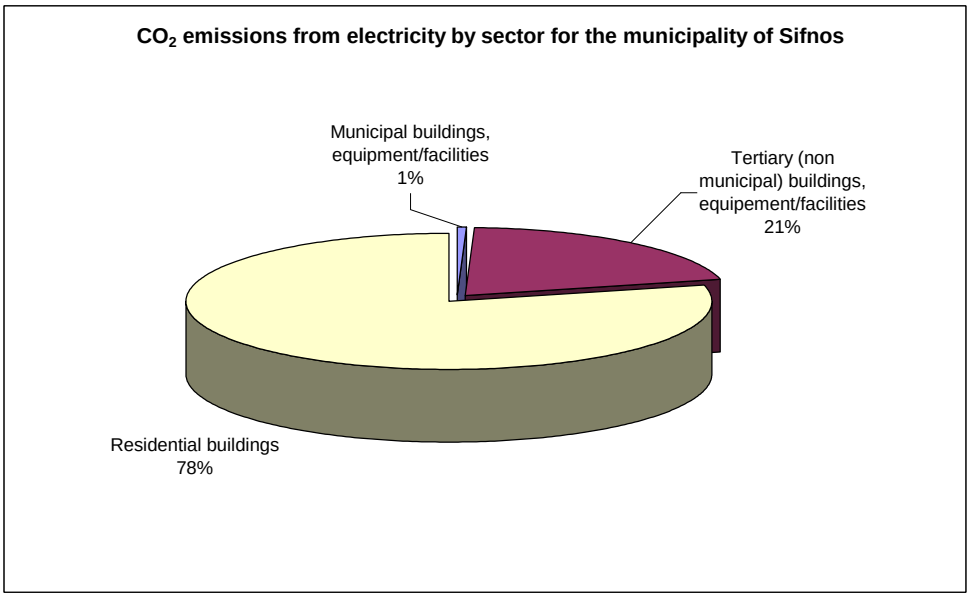

Figure 3.4. CO_2 emissions for electricity by sector in Sifnos for the year of 2001

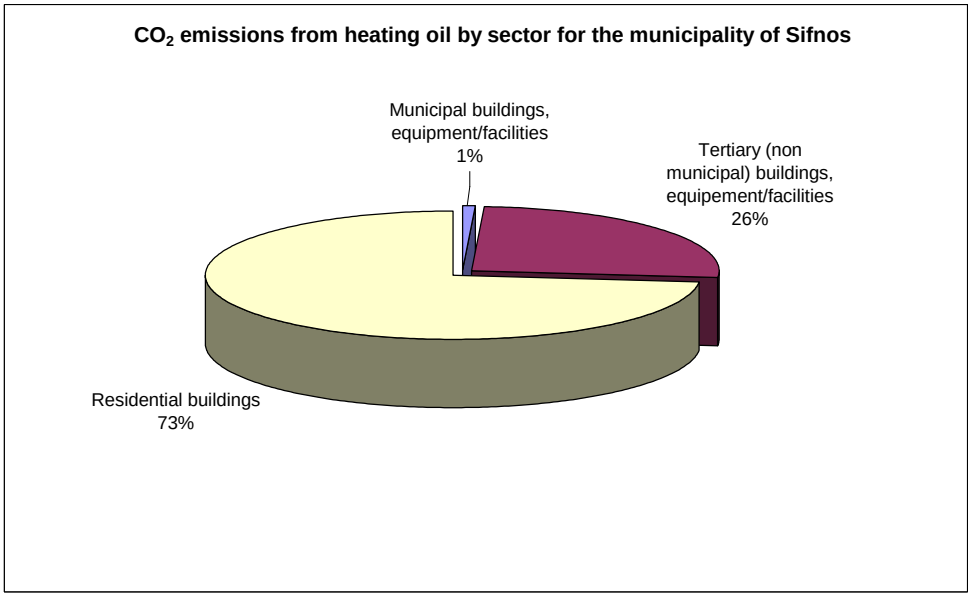

Figure 3.5. CO_2 emissions for heating oil by sector in Sifnos for the year of 2001

Table 3.2. CO_2 emissions by sector and energy source in Sifnos for 2001

Category	Electricity [t]	Heating oil [t]	Other biomass [t]
Municipal buildings, equipment/facilities	104	11.83	0
Tertiary (non municipal) buildings, equipment/facilities	4,107.37	377.27	0
Residential buildings	15,738.84	1,073.74	442.05
Total	**19,950.21**	**1,462.84**	**442.05**

In 2001, the total CO_2 emissions for the building sector are 21,855.1 t. The same situation as above occurs; namely most of the CO_2 emissions derive from the residential buildings; they occupy 78% of the total CO_2 emissions from electricity CO_2 emissions and 73% of the total CO_2 emissions from heating oil. Due to the use of fireplaces in the residential buildings, this responds in the CO_2 emissions from biomass (wood) of 442.05 t CO_2.

The tertiary sector occupies 21% of the CO_2 emissions from electricity and 26% of the total heating oil consumption and the municipal buildings occupy 1% of the total CO_2 emissions from electricity and 1% of the total CO_2 emissions from heating oil consumption.

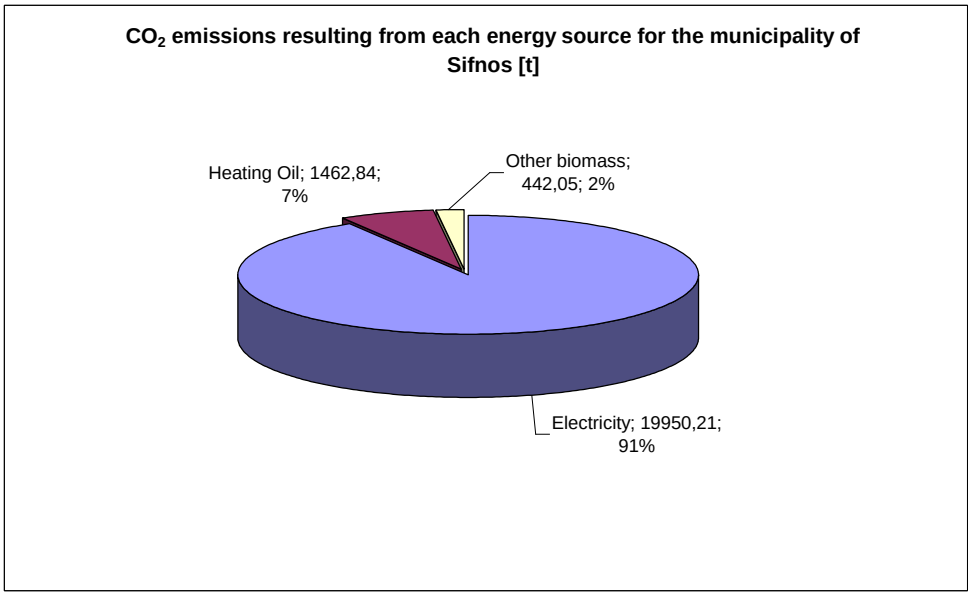

Figure 3.6. CO_2 emissions resulted from the energy sources in Sifnos for the year of 2001

Regarding the distribution of CO_2 emissions in the municipality of Sifnos in 2001, emissions from electricity (19,950.21 t) occupy the largest portion which is 91%; whilst CO_2 emissions from heating oil (1,462.84 t) occupy 7% and biomass (wood) (442.05 t) occupy 2% of the total CO_2 emissions.

4. DESCRIPTION OF FINAL ACTIONS

Category	Action	Estimated cost [€]	Expected energy saving [MWh/a]	Expected CO_2 reduction [t/a]
BUILDINGS, EQUIPMENT / FACILITIES & INDUSTRIES:				
Municipal buildings	Action 1: Replacement of windows (single glazing with double glazing with high thermal properties and old window frames with new high efficiency) Action 2: Installation of external thermal insulation where it is allowed and internal thermal insulation where it is feasible in the non-insulated spaces Action 3: Replacement of the old heating systems (boilers and/or heating piping systems) with new ones of high efficiency	1: 49005.0 2: 22869.0 3: 11434.0	1: 15.5 2: 7.7 3: 4.4	1: 5.0 2: 2.5 3: 1.2
Tertiary (non municipal) buildings	Action 1: Replacement of windows (single glazing with double glazing with high thermal properties and old window frames with new high efficiency) Action 2: Installation of external thermal insulation where it is allowed and internal thermal insulation where it is feasible in the non-insulated spaces Action 3: Replacement of the old heating systems (boilers and/or heating piping systems) with new ones of high efficiency	1: 609147.0 2: 284268.0 3: 213201.0	1: 395.5 2: 197.7 3: 74.2	1: 130.4 2: 65.2 3: 19.8

Residential buildings	Action 1: Replacement of windows (single glazing with double glazing with high thermal properties and old window frames with new high efficiency) Action 2: Installation of external thermal insulation where it is allowed and internal thermal insulation where it is feasible in the non-insulated spaces Action 3: Replacement of the old heating systems (boilers and/or heating piping systems) with new ones of high efficiency Action 4: Conversion of old fireplaces to high efficiency ones	1: 4486204.0 2: 2307191.0 3: 437405.0 4: 937296.0	1: 2587.4 2: 1552.5 3: 289.8 4: 219.3	1: 804.7 2: 482.8 3: 77.3 4: 88.4

5. SUSTAINABLE ENERGY ACTION PLAN (SEAP)

Sustainable Energy Action Plan (SEAP) template

This is a working version for Covenant signatories to help in data collection. However the on-line SEAP template available in the Signatories' Corner (password restricted area) at: http://members.eumayors.eu/ is the only REQUIRED template that all the signatories have to fill in at the same time when submitting the SEAP in their own (national) language.

OVERALL STRATEGY

1) Overall CO2 emission reduction target

20 (%) by **2020**

? Instructions

Please tick the corresponding box:

- ☑ Absolute reduction
- ☐ Per capita reduction

2) Long-term vision of your local authority (please include priority areas of action, main trends and challenges)

Reduction of CO_2 emissions in the building sector of the municipality (tertiary, domestic and municipal buildings)

3) Organisational and financial aspects

Coordination and organisational structures created/assigned	The department of environment in the municipality of Sifnos which is involved with environmental issues was involved and the Centre for Renewable Energy Sources and Saving (CRES) was responsible for the development of this
Staff capacity allocated	The department of environment in the municipality of Sifnos will be the basis for the development of the Energy Office responsible for the development and implementation of the sustainable energy policy as well as monitor and evaluation of the action plan.
Involvement of stakeholders and citizens	The involvement of stakeholders and citizens will be achieved through their participation in the Energy Office
Overall estimated budget	9358022,7
Foreseen financing sources for the investments within your action plan	National Strategic Reference Framework (NSRF), Operational Programme "Environment and Sustainable Development" (EPPERAA), Strategic Plans for Development of South Aegean Region 2011-2020
Planned measures for monitoring and follow up	The energy consumption of the relevant sectors will be calculated and compared every two years so as to evaluate the effectiveness of the actions undertaken and to revise them if needed.

Go to the second part of the SEAP template -> dedicated to your Baseline Emission Inventory!

More information: www.eumayors.eu.

Sustainable Energy Action Plan (SEAP) template

BASELINE EMISSION INVENTORY

1) Inventory year 2001

For Covenant signatories who calculate their CO2 emissions per capita, please precise here the number of inhabitants during the inventory year:

? Instructions

2) 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

3) Key results of the Baseline Emission Inventory

Green cells are compulsory fields

Grey fields are non editable

A. Final energy consumption

Please note that for separating decimals dot [.] is used. No thousand separators are allowed.

Category	FINAL ENERGY CONSUMPTION [MWh]															
			Fossil fuels								Renewable energies					
	Electricity	Heat/cold	Natural gas	Liquid gas	Heating Oil	Diesel	Gasoline	Lignite	Coal	Other fossil fuels	Plant oil	Biofuel	Other biomass	Solar thermal	Geothermal	Total
BUILDINGS, EQUIPMENT/FACILITIES AND INDUSTRIES:																
Municipal buildings, equipment/facilities	92,92				61,95											
Tertiary (non municipal) buildings, equipment/facilities	3672,16				1977,32											
Residential buildings	9136,27				2811,16								4216,74			
Municipal public lighting																
Industries (excluding industries involved in the EU Emission trading scheme - ETS)																
Subtotal buildings, equipments/facilities and industries	12901,35				4850,4308								4216,74			
TRANSPORT:																
Municipal fleet																
Public transport																
Private and commercial transport																
Subtotal transport																
Total	**12901,35**				**4850,4308**	**0**	**0**									

Municipal purchases of certified green electricity (if any) **[MWh]:**	
CO2 emission factor for certified green electricity purchases (for LCA approach)**:**	

B. CO2 or CO2 equivalent emissions

Please note that for separating decimals dot [.] is used. No thousand separators are allowed.

Category	CO2 emissions [t]/ CO2 equivalent emissions [t]															
			Fossil fuels								Renewable energies					
	Electricity	Heat/cold	Natural gas	Liquid gas	Heating Oil	Diesel	Gasoline	Lignite	Coal	Other fossil fuels	Biofuel	Plant oil	Other biomass	Solar thermal	Geothermal	Total
BUILDINGS, EQUIPMENT/FACILITIES AND INDUSTRIES:																
Municipal buildings, equipment/facilities	104				11,83											
Tertiary (non municipal) buildings, equipement/facilities	4107,37				377,27											
Residential buildings	15738,84				1073,74								442,05			
Municipal public lighting																
Industries (excluding industries involved in the EU Emission trading scheme - ETS)																
Subtotal buildings, equipments/facilities and industries	19950,21				1462,84								442,05			
TRANSPORT:																
Municipal fleet																
Public transport																
Private and commercial transport																
Subtotal transport																
OTHER:																
Waste management																
Waste water management																
Please specify here your other emissions																
Total	**19950,21**				**1462,84**											

Corresponding CO2-emission factors in [t/MWh]	
CO2 emission factor for electricity not produced locally [t/MWh]	

C. Local electricity production and corresponding CO2 emissions

Please note that for separating decimals dot [.] is used. No thousand separators are allowed.

Locally generated electricity (excluding ETS plants , and all plants/units > 20 MW)	Locally generated electricity [MWh]	Energy carrier input [MWh]											CO2 / CO2-eq emissions [t]	Corresponding CO2-emission factors for electricity production in [t/MWh]
		Fossil fuels					Steam	Waste	Plant oil	Other biomass	Other renewable	other		
		Natural gas	Liquid gas	Heating oil	Lignite	Coal								
Wind power														
Hydroelectric power														
Photovoltaic	67,4													
Combined Heat and Power														
Other *Please specify: _____*														
Total														

D. Local heat/cold production (district heating/cooling, CHPs…) and corresponding CO2 emissions

Please note that for separating decimals dot [.] is used. No thousand separators are allowed.

Locally generated heat/cold	Locally generated heat/cold [MWh]	Energy carrier input [MWh]										CO2 / CO2-eq emissions [t]	Corresponding CO2-emission factors for heat/cold production in [t/MWh]
		Fossil fuels					Waste	Plant oil	Other biomass	Other renewable	other		
		Natural gas	Liquid gas	Heating oil	Lignite	Coal							
Combined Heat and Power													
District Heating plant(s)													
Other *Please specify: _____*													
Total													

4) Other CO2 emission inventories

If other inventory(ies) have been carried out, please click here ->

Otherwise go to the last part of the SEAP template -> dedicated to your Sustainable Energy Action Plan

More information: www.eumayors.eu.

Sustainable Energy Action Plan (SEAP) template

SUSTAINABLE ENERGY ACTION PLAN

1) Title of your Sustainable Energy Action Plan

Save Energy for Tomorrow

Date of formal approval

Authority approving the plan

? Instructions

2) Key elements of your Sustainable Energy Action Plan

Green cells are compulsory fields

Grey fields are non editable

SECTORS *& fields of action*	KEY actions/measures per field of action	Responsible department, person or company (in case of involvement of 3rd parties)	Implementation [start & end time]	Estimated costs per action/measure	Expected energy saving per measure [MWh/a]	Expected renewable energy production per measure [MWh/a]	Expected CO2 reduction per measure [t/a]	Energy saving target per sector [MWh] in 2020	Local renewable energy production target per sector [MWh] in 2020	CO2 reduction target per sector [t] in 2020
BUILDINGS, EQUIPMENT / FACILITIES & INDUSTRIES:										
Municipal buildings, equipment/facilities	Action 1: Replacement of windows (single glazing with double glazing with high thermal properties and old window frames with new high efficiency) Action 2: Installation of external thermal insulation where it is allowed and internal thermal insulation where it is feasible in the non-insulated spaces Action 3: Replacement of the old heating systems (boilers and/or heating piping systems) with new ones of high efficiency	Municipality of Sifnos	2012	1: 49005.0 2: 22869.0 3: 11434.0	1: 15.5 2: 7.7 3: 4.4		1: 5.0 2: 2.5 3: 1.2			
Tertiary (non municipal) buildings, equipment/facilities	Action 1: Replacement of windows (single glazing with double glazing with high thermal properties and old window frames with new high efficiency) Action 2: Installation of external thermal insulation where it is allowed and internal thermal insulation where it is feasible in the non-insulated spaces Action 3: Replacement of the old heating systems (boilers and/or heating piping systems) with new ones of high efficiency	Building owners	2012	1: 609147.0 2: 284268.0 3: 213201.0	1: 395.5 2: 197.7 3: 74.2		1: 130.4 2: 65.2 3: 19.8			
Residential buildings	Action 1: Replacement of windows (single glazing with double glazing with high thermal properties and old window frames with new high efficiency) Action 2: Installation of external thermal insulation where it is allowed and internal thermal insulation where it is feasible in the non-insulated spaces Action 3: Replacement of the old heating systems (boilers and/or heating piping systems) with new ones of high efficiency Action 4: Conversion of old fireplaces to high efficiency ones	Building owners	2012	1: 4486204.0 2: 2307191.0 3: 437405.0 4: 937296.0	1: 2587.4 2: 1552.5 3: 289.8 4: 219.3		1: 804.7 2: 482.8 3: 77.3 4: 88.4			
Municipal public lighting										
Industries (excluding industries involved in the EU Emission trading scheme - ETS) & Small and Medium Sized Enterprises (SMEs)										
Other - please specify: _____										
TRANSPORT:										
Municipal fleet	Action 1: _____ Action 2: _____ ...	1: _____ 2: _____ ...	1: _____ 2: _____ ...	1: _____ 2: _____ ...	1: ___ 2: ___ ...	1: ___ 2: ___ ...	1: ___ 2: ___ ...			
Public transport										
Private and commercial transport										
Other - please specify: _____										
LOCAL ELECTRICITY PRODUCTION:										
Hydroelectric power	Action 1: _____ Action 2: _____ ...	1: _____ 2: _____ ...	1: _____ 2: _____ ...	1: _____ 2: _____ ...	1: ___ 2: ___ ...	1: ___ 2: ___ ...	1: ___ 2: ___ ...			
Wind power										
Photovoltaic										

Combined Heat and Power								
Other - please specify: _____								
LOCAL DISTRICT HEATING / COOLING, CHPs:								
Combined Heat and Power	Action 1: _____ Action 2: _____ ...	1: _____ 2: _____ ...	1: _____ 2: _____ ...	1: _____ 2: _____ ...	1: ___ 2: ___ ...	1: ___ 2: ___ ...	1: ___ 2: ___ ...	
District heating plant								
Other - please specify:_____								

LAND USE PLANNING:										
Strategic urban planning	Action 1: _____ Action 2: _____ ...	1: _____ 2: _____ ...	1: _____ 2: _____ ...	1: _____ 2: _____ ...	1: ___ 2: ___ ...	1: ___ 2: ___ ...	1: ___ 2: ___ ...			
Transport / mobility planning										
Standards for refurbishment and new development										
Other - please specify: _____										
PUBLIC PROCUREMENT OF PRODUCTS AND SERVICES:										
Energy efficiency requirements/standards	Action 1: _____ Action 2: _____ ...	1: _____ 2: _____ ...	1: _____ 2: _____ ...	1: _____ 2: _____ ...	1: ___ 2: ___ ...	1: ___ 2: ___ ...	1: ___ 2: ___ ...			
Renewable energy requirements/standards										
Other - please specify: _____										
WORKING WITH THE CITIZENS AND STAKEHOLDERS:										
Advisory services	Action 1: _____ Action 2: _____ ...	1: _____ 2: _____ ...	1: _____ 2: _____ ...	1: _____ 2: _____ ...	1: ___ 2: ___ ...	1: ___ 2: ___ ...	1: ___ 2: ___ ...			
Financial support and grants										
Awareness raising and local networking										
Training and education										
Other - please specify: _____										
OTHER SECTOR(S) - *Please specify: _____*										
Other - Please specify: _____	Action 1: _____ Action 2: _____ ...	1: _____ 2: _____ ...	1: _____ 2: _____ ...	1: _____ 2: _____ ...	1: ___ 2: ___ ...	1: ___ 2: ___ ...	1: ___ 2: ___ ...			
					TOTAL:					

3) Web address

Direct link to the webpage dedicated to your SEAP (if any)

More information: www.eumayors.eu.

6. FUNDING RESOURCES

The municipal of Sifnos will search for funding under the operational Programme “Environment and Sustainable Development”. In addition there are national programmes targeted at the domestic sector. The Programme ‘Energy Saving at Home’ has been announced, by the Ministry of Environment, Energy and Climate Change, in July 2010. The Programme foresees financial incentives for energy refurbishment of private residential buildings. It provides low interest rate loans, (or no interest rate) combined with subsidies, depending on the income of the applicant, for thermal insulation of the building shell, window replacement and upgrading of the heating system.

In addition, the Programme “PVs on roofs” has been announced by the Ministry of Environment, Energy and Climate Change, in June 2009 promotes the installation of photovoltaic panels with power less than 10 kW on roofs of buildings of domestic and tertiary sector.

7. MONITORING & REVIEW

The Energy Office will undertake the monitoring and review of the sustainable energy action plan. The Office will consist of representatives from the local government (department of environmental issues) and from the local associations in order to be ensured the participation of the main local stakeholders.

The energy consumption of the relevant sectors will be monitored and compared every two years so as to evaluate the effectiveness of the actions undertaken and to revise them if needed.