Sustainable Energy Action Plan

Asenovgrad Municipality 2013-2020

ENERGY STRATEGY MUNICIPALITY ASENOVGRAD

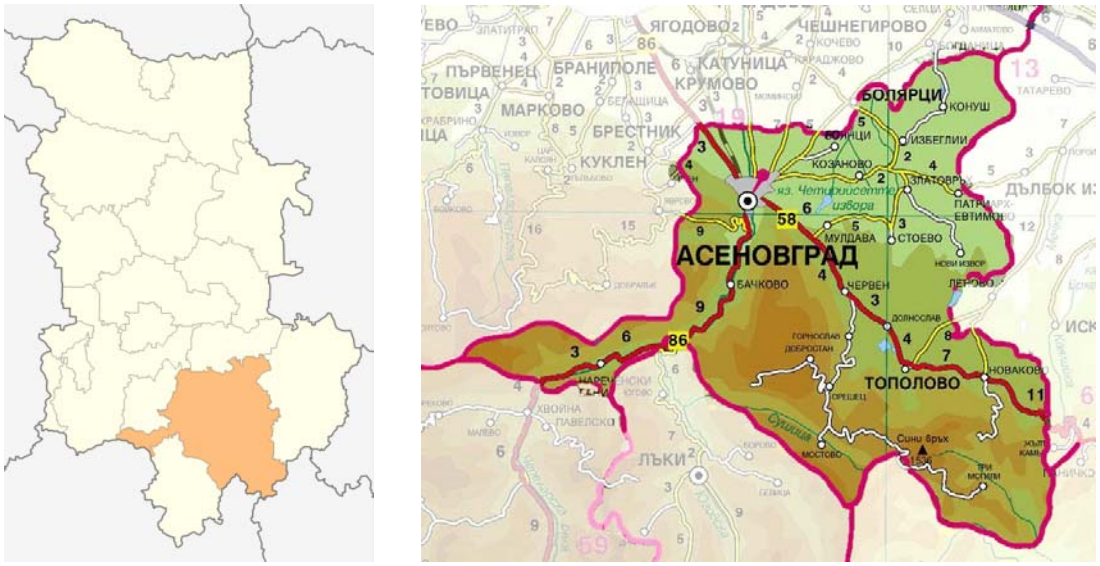
Table of contents

PART I. Affecting factors for energy planning in Municipality

1. Teritory

Municipality town is located in the southern part of the Plovdiv region and borders the municipalities of Plovdiv, Sadovo Parvomai, Lucky, Puppet, Perushtitza, Rodopi, Chernoochene (Kardzhali) and Banite (Smolyan). The municipality is located in the gorge of the Chepelare river and its exit from the Rhodopes to the Thracian lowland. Therefore Municipality Asenovgrad appears as natural link between Central Bulgaria, Central Rhodopes and the Aegean. Through its territory passes one of important transport corridors: Plovdiv - Smolyan - Zlatograd - Greece. The varied topography of the municipality - from mountain to valley of the Maritsa River, determines the economic importance of the territory included in it. These resources create opportunities for human habitation and favourable conditions for the development of almost all economic, cultural, sports and other activities.
Asenovgrad is situated on both riversides of the river Asenitsa (Chepelarska Chaya). North covers a small part of the Thracian Plain in the south covering large areas of the Rhodope Mountains, where the terrain is rugged, with shaped hills, sharp peaks and deep gorges cut by rivers Chepelarska, Lukovitza, Mostovska Sushitsa, Yugovska and others.

The altitude varies from 200 to 1500 m. Municipality's is 615 square kilometers. Asenovgrad - The municipal center is the largest town in the Rhodope Mountains and the second largest in the Plovdiv region. It is situated at the foot of the mountain about 220 meters above sea level and is 19 km away from Plovdiv.



Фигура 1. Област Пловдив и Община Асеновград

Most of the area of Assenovgrad occupied by farmland and woodlands. Geographical location of the municipality is very favorable and suggests the development of nearly all agricultural industries and cultures. The territory of municipality is poor in mineral resources, but has water resources including spa and thermal waters. There are several places for mining, including aggregates for construction.
In the municipality operating businesses in most sectors of the economy.

2.Climate

Municipality town is located in the transitional-and mountain climate area. Mountainous area is characterized by cool summers and longer winters with very cold days. Rainfall is more in the form of snow that stays sometimes until April. Thracian Plain is characterized by a cool spring, hot summer, mild autumn, winter is relatively mild here with higher warming under the influence of Mediterranean cyclones. Snowfalls are few and do not stay for long. Here cross the coolness of "night breeze" which comes from the mountain, with the heat of summer. Asenovgrad Municipality has a rich and varied vegetation, which is a part of the energy resource. There are fir, and white pine, common beech, oak and others.

3. Population and buildings

3.1.Population

The main part of population is concentrated in Asenovgrad. The largest villages in municipality are Topolovo, Boyantsi and Muldava. Villages with population of less than 100 people are 12.

3.2.Buildings

In the 2011 census has established the following housing:

Table 3. Housing in Municipality Asenovgrad:

	Housing and households				
	Buildings	**Villas**	homes	Households	Population-residence
	Count on cards				
Asenovgrad	6595	434	12465	9707	26545
Villages	7690	186	7874	4440	11326
Municipality total - cards	14285	620	20339	14147	37871
	electronic counting				
Municipality total - electromic			8364	8889	25161
Municipality total	**14285**	**620**	**28703**	**23036**	**63032**

The main part of the building was built in the period up to 1990 and they meet energy standards at the time of construction. These standards differ significantly with those established in 2011. This fact is particularly important because in recent years the price of energy (electricity, natural gas, fuel oil, etc.) has increased significantly, respectively the expenses for heating of buildings have increased too. This leads to the need of implementation of energy saving measures, accordingly reduction of carbon emissions, which is one of the most important factors for environment protection.

4.Energy system of Asenovgrad

Energy system of the municipality include:
- Grid;
- Gas distribution network;
- District heating network;
- Domestic heating systems.

All of them, except the grid, which includes two local hydro-power stations receive energy from

external sources.
Local distribution network in town is owned by EVN Bulgaria.

5.Energy sources in the municipality and energy potential

5.1. Minerals

Municipality is poor in minerals. In the past, magnesium mine is exploited for the extraction of magnesite in Gornoslav village, but it has closed down in 1973.

Municipality is rich in aggregates.

5.2. Water resources

The largest river flowing through the municipality is Chepelarska (till 1942 called Chaya, after 1945 Asenitsa). Chepelare River originates from springs in Rojen col. After Asenovgrad river enters the Thracian valley and flows into the Maritsa river. It's watershed occupies a massive area of 1200 km^2. River's water used for power generation (hydro Chepelare, hydro Asenitsa - 1 and 2) and irrigation of Pazardzhik and Plovdiv area. The most important tributaries are Zaburdska river, Oreshitsa, Lukovska river, Mostovska, Sushitsa and Yugovska.

In Municipality's territory there are several dams - near villages Gornoslav, Dolnoslav (Shushitsa), Topolovo - 3 pieces, Novakovo, 2 pieces, Lenovo and Zlatovrah - one. The dam at the village Gornoslav is mainly used for irrigation of tobacco plants.

By means of drilling in Asenovgrad are detected mineral waters. For the period 1968 - 1969 were made 6 wells. Currently operated 2 drillings (waters are sub-thermal, karst without healing properties and sulphate, hydro-carbonate-sodium).

Drinking water of the city is from karst springs. There are two sources: the village Bachkovo (Kluviyata) has a capacity of about 105 l / s at a favorable time and 30-40 l / s in dry weather. The water source in village Muldava has a capacity of about 190 l / sec. Studied a new water source by villages Katunica and Karadjovo with capacity of 400 l / sec. Available water resources are sufficient to meet the needs of industrial and drinking water supply in perspective.

5.2.1. Geothermal springs

In Municipality's area is located balneologocal resort Narechen (640 m altitude). Mineral waters in resort Narechen spring from several natural sources and drilling, the majority of them are hypothermal (33 °C), low mineralized, clear, colorless, odorless and with good taste quality. There is also a hydrothermal source with higher radioactivity of the mineral water (with radon 4070 Bq) and with a lower temperature - 21,5 ° C. Unique hypothermic mineral water, the mild climate and the increased air ionization provide effective therapeutic effect in nervous diseases, diabetes, post stroke conditions. In Naretchen spa resort has a specialized hospital for rehabilitation.

At present the energy potential of mineral resources is less important than their healing properties.

5.3. solar radiation

Asenovgrad Municipality is located on the border of the first and second zone with the following climatic characteristics:
Average annual sunshine duration - in period 31.03 - 31.10 up to 1,750 hours, in the period 31.10 - 31.03 - over 500 hours. Total solar radiation in the region of the Municipality is in range 1450 - 1500 kWh/m^2 per year.

In the municipal area has several teritories near villages Oreshets and Dobrostan, which are suitable for building of photvoltaic plant or a wind farm.

5.4 Biomass

Another source of energy in municipality is biomass, which includes wood, crop waste or specially grown energy crops, waste from livestock and more.

5.4.1. Forest areas

Forest areas in the municipality occupy 40.72 percent of it's total territory.

State Forestry Asenovgrad with headquarters in town is established in 1903. The division manages the state forest areas within municipalities Asenovgrad and Sadovo in Plovdiv region. The member of the unit includes 42 territories.

Total forest area falling within the scope of the State Forestry Asenovgrad is 29997 ha. Including state forest areas 26,929 ha (90%). 24,931 ha are forests with special functions (83.1%), including forests with protective functions, resort areas, protected areas, etc..

Altitude in State Forestry Asenovgrad is between 120 m - along the river Maritsa and 1517 m - peak Old Bounar in village Dobrostan.
The climate within the area is continental, which optimal for natural and artificial trees developpment.

Given that 83.1% of the managed forestry areas are forest with special functions, it can be said that the conditions for logging are limited, but this does not exclude the availability of waste timber, which can be used to produce of wood chips and pellets.

Besides firewood, in this case should be considered waste from logging and wood processing as energy resource

5.4.2. Farming

Agriculture in the region of Assenovgrad is characterized by the cultivation of cereals and industrial crops, vegetables, grapes. Along with this further processing is done - production of cans, flour, wine, etc. Industrial crops grown in the region are: tobacco, sunflower and peanuts.

At present, mainly grown: wheat (about 6500 ha), barley (about 1200 ha), sunflower (about 1600 ha), tobacco (204 ha).

Plantations in the municipality include: cherries, peaches, apples, cherries, quinces, almonds and walnuts.

Newly established plantations are: cherry - 61 acres, raspberries - 15 acres, peaches - 42 acres, apricots - 3 acres, vineyards - 55.5 acres and table grapes - 7.5 ha.

Crops remains' mainly include stems and leaves that are harvested or removed from the field for commercial purposes. This includes - stalks, leaves, husks and cobs, wheat stalks and rice stalks. The average yield of straw is between 500-600 kg/ha. Furthermore there is waste in the cutting of the vineyards and orchards.

Approximately 80,000 acres cultivated with cereals, straw yield is 40,000 tons.

Some are used in livestock..
According to the National Statistical Institute unused straw is usually 20% of the produced volume, which means that 8,000 tons can be used to produce heat or cogeneration.

5.4.3. Livestock.

In the region cows, goats, sheep, pigs, poultry, and draft animals are growing. There are two cowfarms with about 700. Other animals are kept by private owners. There are four dairies for milk processing.

5.5. Wind

Usually the wind data in different regions of the country presented it's average speed, direction and duration.

The potential of wind in the municipality Asenovgrad is not high and it is less than 250 MW. This does not exclude the possibility of holding local measurements in certain areas which are suitable for the deployment of a small-scale wind turbines. In developpment of this plan are taken into account several places around villages Oreshets and Dobrostan, for further realization of wind or PV plant.

This means that wind resources in the municipality are insignificant. In the mountainous part of the municipality there are places where can be placed small wind turbines, but it requires a preliminary exploration of wind resources to assess the feasibility of such projects.

5.6 .Hydropower sources

The Municipality Asenovgrad operate two hydroelectric power plants:
- HPP Asenitsa 1 to 6.7 MW
- HPP Asenitsa 2 to 1.6 MW

that are connected to the electricity distribution network in the region.

Cascade "Asenitsa" - combines spatial and functional two technological related stations - HPP "Asenitsa" I and II. For energy production water of the river Chaya (Chepelare) is used. Owner of the cascade is "Runo Kazanlak AD" - a group of several companies operating in the energy sector.

6. Summary of energy consumption in Asenovgrad Municipality. Conclusions

Energy consumption in Asenovgrad Municipality, according to official regulations of the "Covenant of Mayors" is distributed in the following sectors:
- Municipal Buildings
- Buildings
- Service sector
- Industry
- Transportation

For each of these sectors need to determine the types of energy used and annual quantities in MWh. Different types of fuels are a source of carbon, which are calculated according to standards set by the State (Table 22).

Table 22. Norms for calculating carbon emissions from fuels

energy source	**gCO_2/kWh**
Industrial oil	311
natural Gas	247
LPG	272
Coal	439
Firewood	6
Diesel	276
Gasoline	268
Electricity	683

To track the trends in energy consumption should be chosen base year against which to determine both the increase in energy consumption with the development of local structures and reducing carbon emissions through energy savings, use of renewable energy sources and application organizational measures to stimulate the process of savings. The choice of base year is related to availability of complete data on the consumption of fuel and energy over the years. Such data Asenovgrad Municipality has since 2007

6.1. Municipal buildings

The diagram in Figure 26 shows energy consumption in municipal buildings during the period 2007 – 2011.

As it's seen in recent years, the structure of energy consumption has barely changed. Natural gas is the main source of energy. Opportunities to improve energy efficiency exist in two directions:
- Gradual switching from diesel as fuel to natural gas or biomass (wood chips, pellets, etc..)
- Implementation of energy saving measures in municipal buildings.

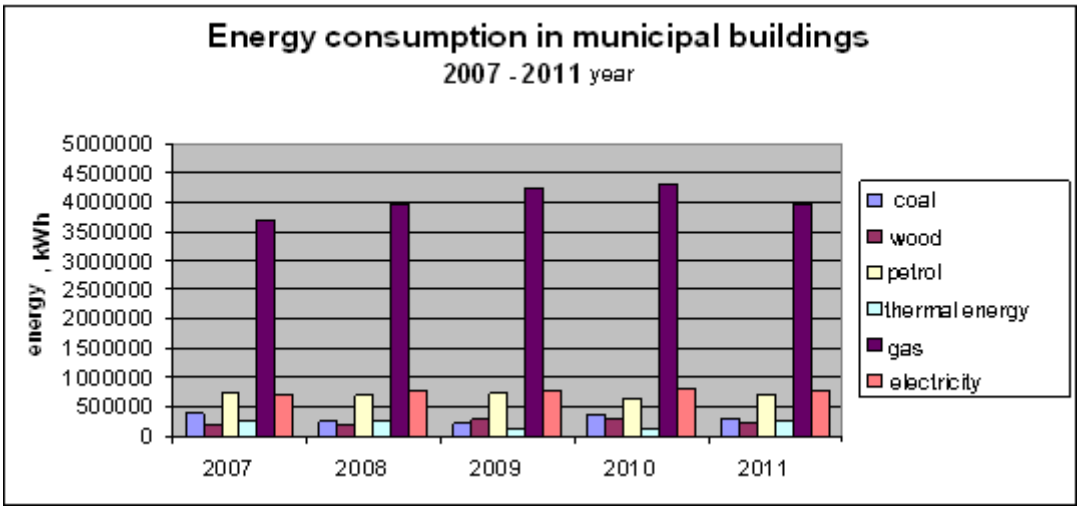


Figure 26. Energy consumption in municipal buildings, 2007 - 2011

According to the municipal administration, energy efficiency research has 15 municipal buildings (kindergartens and schools) from 40 ones. Energy saving measures (ESM) is implemented in 5 of them and reported effect is not great. This means that where there has three years from the date of the energy audit not expired, is better to start renovating and where the term has expired it is nacessary to do it again and to implement the recommendations of the auditor.

In a well-made economic analysis it is not a hard to obtain the necessary loans. Energy saving measures (ECM) represents a significant reserve of the municipality to reduce carbon emissions and this should be used.

6.2. Houses

It is difficult to define the energy consumption in the residential sector by general data provided for the annual electricity consumption and the lack of the use of wood and fuel oil.

Precise data are only for the of natural gas consumption.

In 2011, in the residential sector consumers are 1325, which would account for 7.30 MWh / year The use of electrical appliances would add approximately another 0.3 MWh / year. As a result annual housing's cost are 7,6 MWh / year

Electricity consumption for Asenovgrad in 2011 is 78,636 MWh / year. At around 19,000 dwellings (after excluding those who use gas for heating) for a home we have the following costs of electricity:

(78636 – 0,3x1325)/19 000 = 4,12 MWh/year.

The difference in the energy required for one hous is complemented by other sources - mainly wood and this energy is 19000 x 3.02 MWh / year = 57380 MWh / year
Gas - 11466 MWh / year
Electricity - 78,636 MWh / year
Other (wood) - 57380 MWh / year

Table 23. Energy consumption of municipal sites in the period 2007 - 2011 г.

Year	Wood		Coal		Heating oil		Heat energy		Natural gas		Electricity	
	m^3	kWh	ton	kWh	ton	kWh	GCal	kWh	m^3x1000	kWh	kWh	kWh
2007	201	198896	156,2	390425	74,63	728935	155	252650	399,159	3697991	694527	694527
2008	200,94	233530	105,9	312440	71,9	705259	145	257619	452,366	3962770	828612	787575
2009	292	288943	86,4	215958	74,89	731455	79,87	130188	456,855	4232513	782438	782438
2010	273,5	270637	147,98	369891	65,24	637259	76	123880	464,301	4301497	819379	819379
2011	236	233530	125	312440	72,21	705259	158,05	257619	427,739	3962770	787575	787575

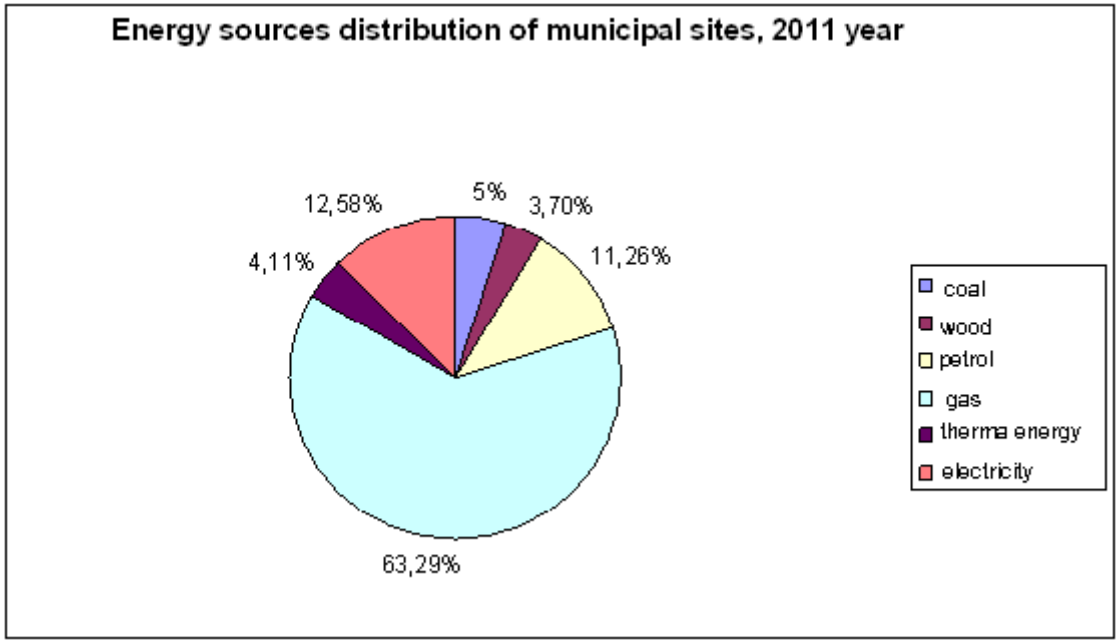


Figure 27. Energy sources distribution of municipal sites, 2011

6.3. Service sector

In the data sources that sector is not distinct and the amount of energy consumed by firms engaged in service activities is included in the group of domestic consumers.

6.4. Industry

There are only data on natural gas consumption in the industrial sector, which are presented in Tables 18 and 19 for 2007 and 2011, and for the remaining years in Appendix 1. Calculated amounts of energy in MWh are shown in Table 24.

Table 24. Energy consumption in industry

	x 1000 nm^3	MWh
2007	2212,000	20593
2008	2087,041	19335
2009	2017,164	18686
2010	3656,300	33871
2011	3698,617	34266

6.5 Transport

Through municipality's teritorry pass major transportation arteries: Plovdiv - Smolyan Asenovgrad - Kardzhali. Railway connects Asenovgrad and Plovdiv. Moreover, there is a regular bus connection between the two cities.

Transport system in the Municipality consists of republican, municipal and local roads and rails. The length of national roads in the municipality is 39.7 km, municipal roads with a length 121.3 km, and local - with length 39 km. Transport network includes built streets in urban areas of the municipality. In Asenovgrad total length of streets is 210 km. and in rural areas is 227 km. The city road network is well developed, with a few exceptions - there are streets paved with gravel and some unpaved. In rural areas the situation is worse, much of the streets are covered with crushed stone and gravel.

Passing through the city transport creates problems such as contamination by carbon dioxide, lead and harmful elements. It is necessary to build the bypass road in northeastern direction Plovdiv - Kardzhali, construction of Flyover by Carbide factory, complete of reconstruction of "Tsar Ivan Assen II" from Popovitsa and some others.

With the start of the project for reconstruction of the road Asenovgrad - Smolyan, 48,606 km in length, will ease congestion of traffic through the municipality and will be part of the infrastructure for speedy passage to Greece in the Rhodopes.

Towards July 2012 in Municipality's teritorry are registered the following vehicles:

- Cars - 20564 pcs.;
- Trucks - 2550 pcs.;
- Buses - 184 pcs.;

Urban transport is served by two companies - "KOMEKSMASH - Vasil Pironkov" Ltd. and "Wheel Transport". In 2011, 5 lines have served with 11 buses running on diesel fuel. Passenger traffic in the same year numbered 776 124 people. Mileage in the base year 2007 is 617,697 km, and in 2011 was 673,790 km.

In the calculation of fuel consumption in the "Transport" sector is not included exhaus emissions pollution from traffic on the main roads Plovdiv - Smolyan Asenovgrad - Kardzhali. Base year 2007 until the fuel consumption of the municipality is shown in the following Table 25.

Table 25. Fuel consumption by year and sub-sectors

Transport	2007	2008	2009	2010	2011
Fuels - public transport (MWh)	614	697	598	603	698
Fuels - private transport (MWh)	59779	68176	68256	68297	69865
Total (MWh)	60393	68873	68854	68900	70563

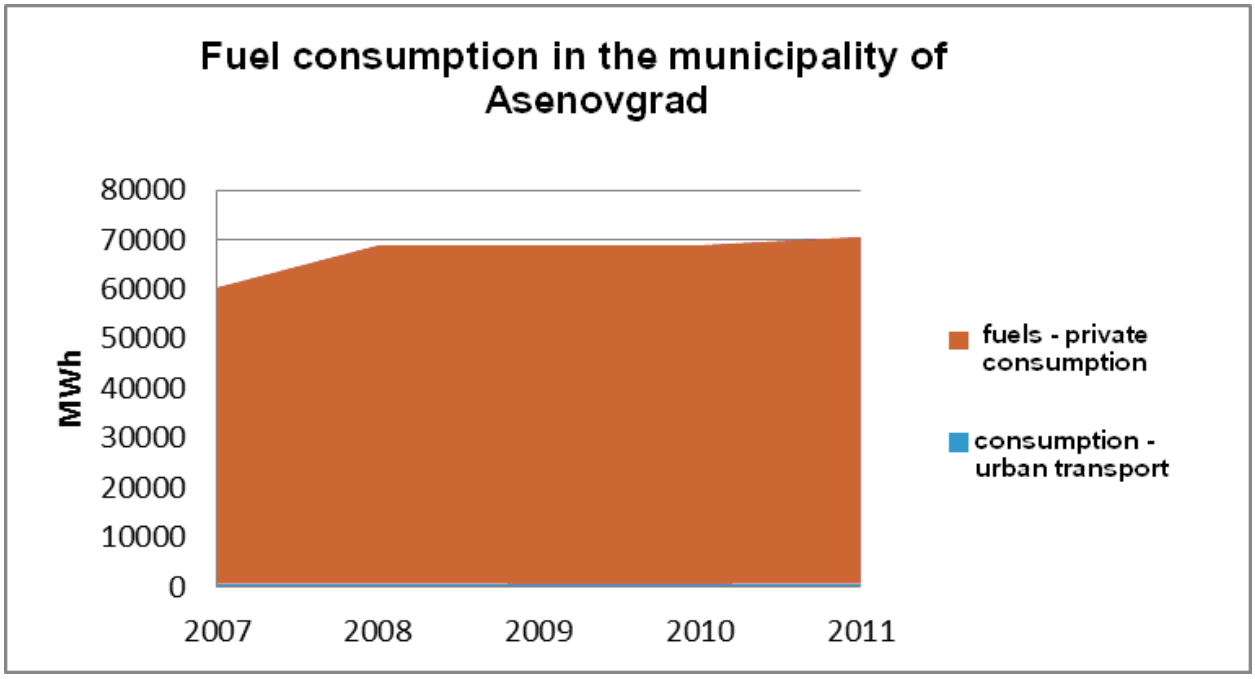


Figure 28. Fuel consumption in the municipality of Asenovgrad

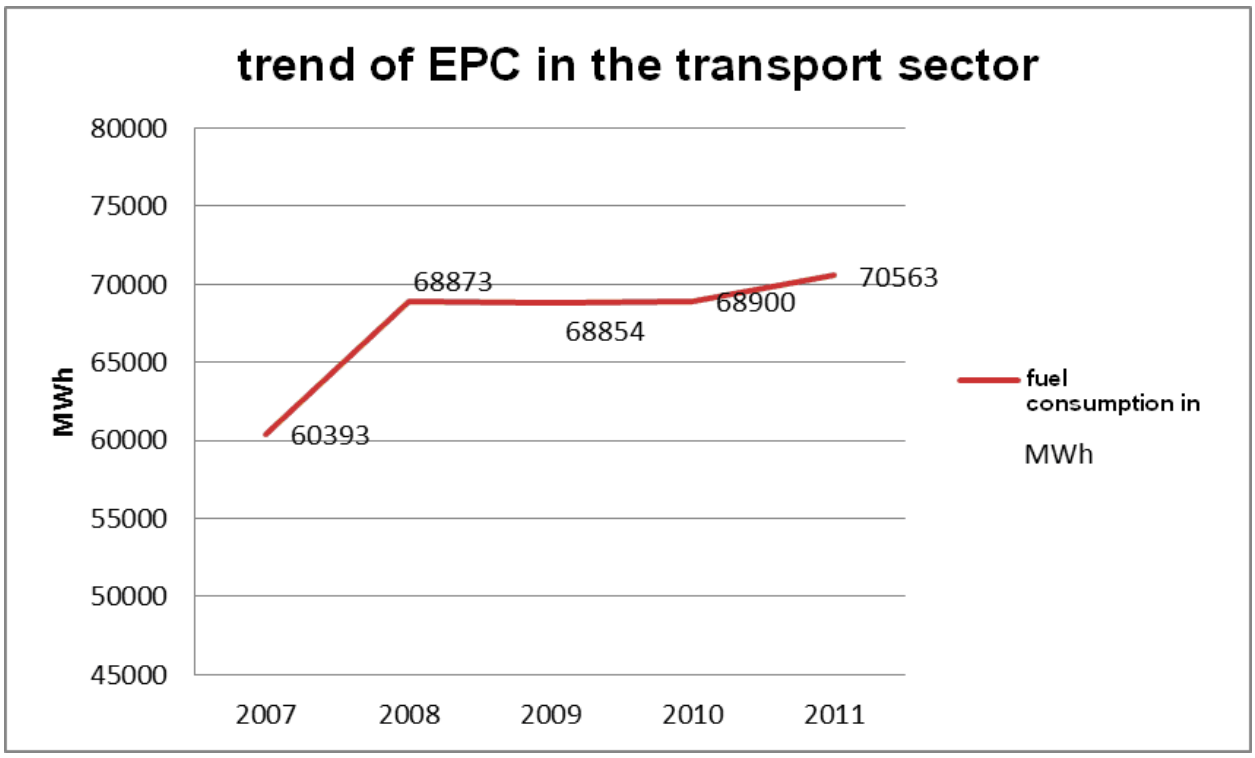


Figure 29. Trend of total energy consumption in the "Transport", MWh

7. Final energy consumption in the base year 2007 sectors' Buildings, facilities and industrial sites "and" Transport "

The results of the inventory of final energy consumption in the sectors "buildings, installations and industrial facilities" and "Transport" in Asenovgrad municipality in the base 2007 are presented in Table 26.

Table 26. Final energy consumption MWh / year

Category	Electricity	Fossil fuels				Renewables	Total
		Natural gas	Diesel& Oil	Benzin	Coal	Wood	
Buildings, equipment / facilities and industrial sites							
Municipal buildings& equipment	694,527	3950,641	728,935		390,425	198,896	5963,424
Houses	68677	9625,772				57380	135682
Municipal lighting	1790,7						1790,7
Industry		40281,863					40281,863
Subtotal buildings, equipment, facilities and industrial sites	71161,742	53858,276	728,935		390,425	57578,896	183718,274
Transport							
Municipal fleet							
Public transport			613,92				
Private transport		29125,082	17119,743	13534,238			
Subtotal Transport		29125,082	17733,633	13534,238			
Total	71161,742	82983,358	18462,598	13534,238	390,425	57578,896	183718,274

Carbon emissions in 2007 are presented in Table 27:

Category	Electricity	Fossil fuels				Renewables	Total
		Natural gas	Diesel& Oil			Natural gas	
Buildings, equipment / facilities and industrial sites							
Municipal buildings& equipment	474,36	975,81	226,7		171,4	1,1933	1849,463
Houses	46906	2377,57				344,28	49628
Municipal lighting	1223,05						1223,05
Industry		9949,62					9949,62
Subtotal buildings, equipment, facilities and industrial sites	48603,8	13303	226,7		171,4	345,4733	62650,37
Transport							
Municipal fleet							
Public transport			169,442				
Private transport		7193,895	4725,049	3627,176			
Subtotal Transport		7193,895	4894,536	3627,176			15715,607
Total	48603,8	20496,895	5121,236	3627,17	171,4	345,4733	78365,977

8.Scenarios

There are two possible scenarios of energy consumption of the municipality in the next period 2013 – 2020. First is a development of the processes of consumption, production and import of energy from external energy sources. The second is intervention by the municipality in energy consumption process in order to reduce carbon emissions in relation to base year, by means of internal resources for the production of renewable energy and efficient use of internal and external resources. Two scenarios can be illustrated with Figure 30

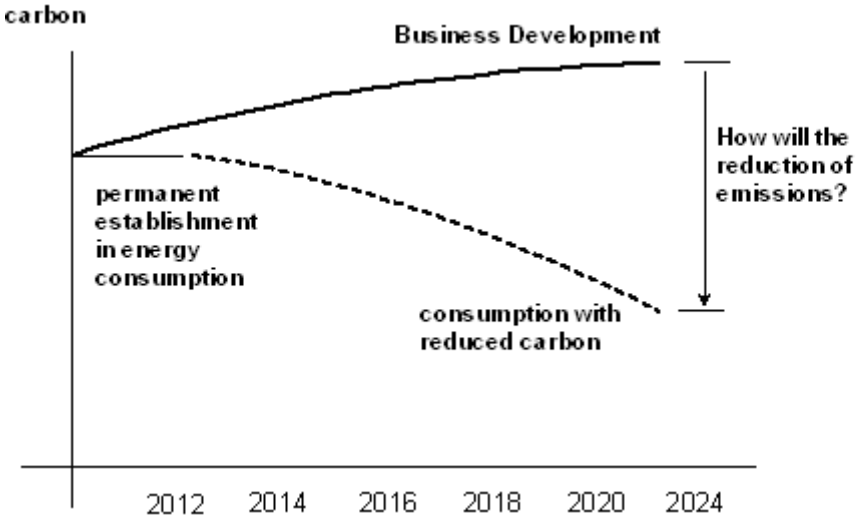


Figure 30. Scenarios of energy consumption of Municipality Asenovgrad

The purpose of SEAP is to identify those activities that will ensure the planned reduction in carbon emissions in 2020.

It can be assumed that in the coming years, the consumption of natural gas will continue to increase, because the price of electricity will increase. The usage of biomass, farming and animal husbandry will increase too. As a significant part of energy consumption is used for heating and lighting (especially in public buildings and streets) it is necessary to implement energy saving measures that can provide at least 30% energy savings.

Possible measures to reduce carbon emissions can be:

Table 28. Measures to reduce carbon emissions

	carbon emissions, tCO_2/y		
	2007	**2020**	**Comment**
1. Switching the heating boilers from oil&diesel to wood (wood chips pellets	171,4	3,31	
2. Insulation of public buildings	474,6	380	
3.Street lighting	1 223,05	850	
4. Increasing domestic natural gas users	46 906	42 534	Provides 6,400 MWh electricity saving
	Renewables		
5. Photoelectric	100 kW power	400 MWh	4000 h/y
6. Biomass cogeneration plants	3 MW power	21 000 MWh	7000 h

PART II. ACTION PLAN

9.Measures and activities

Measures and activities in Action Plan are determined by the objectives and priorities of the municipality for sustainable energy development. They are presented in the following table:

Table 29. Objectives and priorities of Action Plan for Sustainable Energy Developpmrnt of Municipality Asenovgrad

Priotity 1	Priotity 2	Priotity 3	Priotity 4
Execution of integrated measures package for improving energy efficiency in municipal sector	Improve energy efficiency in residential buildings in the municipality	Increasing energy efficiency in local industry	Introduction of energy management in the municipality
Target 1.1. Increasing energy efficiency in municipal buildings by at least 30%	**Target 2.1.** Intensification of the processes of an overall renovation of residential buildings	**Target 3.1.** Encouraging business investment for building power plants and infrastructure in the municipality	**Target 4.1.** Increase local capacity for sustainable energy development
Target 1.2. Renovation of the street lighting system of the Municipality of Asenovgrad	**Target 2.2.** Raising public awareness and building a culture of energy efficient behavior in the domestic sector	**Target 3.2.** Support for changing energy behavior in business	**Target 4.2.** Exploring the potential for energy efficiency and renewables and the possibilities for its utilization
Target 1.3. Increasing energy efficiency in public transport	**Target 2.3.** Increasing the share of energy consumption from renewable energies in housing		**Target 4.3.** Mobilize public support for the implementation of the Action Plan "My City in 2020"
Target 1.4. Increasing the share of renewables in the public sector			

10. Analysis of the strengths, weaknesses, opportunities and threats in the implementation of the Action Plan for Sustainable Energy Municipality Asenovgrad 2013 - 2020 г.

STRENGTHS	WEAKNESSES
S1: Relatively clean area - almost no polluting industries; **S2**: Introduced and effectively operating to ISO 14 0001; **S3**: Gasification industry, municipal buildings, increasing domestic gas; **S4**: Improved energy performance of buildings by introducing a package of energy efficiency measures; **S5**: Built and effectively working electrical transport network; **S6**: Used opportunities for utilization of renewable energy; **S7**: Availability of expertise and resources in the municipal administration for preparation and implementation of long-term projects; **S8**: annual information campaigns and initiatives to change energy behavior of the public; **S9**: Awareness of the role of local government as a model of intelligent energy behavior; **S10**: Active civil society.	**W1**: General trend of significant increase in the consumption of electricity, respectively, the share of emission of greenhouse gases into the atmosphere; **W2**: Increase in final energy consumption due to consumption of conventional energy ; **W3**: insufficient usage of energy from renewable sources; **W4**: Insufficient implemented energy efficiency projects ; **W5**: Insufficient financing of energy efficiency / renewable energy activities **W6**: Insufficient level of public awareness on how the rational use of energy and the implementation of measures to save energy ; **W7**: Lack of local and state incentives for small and medium-sized enterprises in the use of renewable energy; **W8**: Obstacles to the accession of installed renewable energy capacity to the grid - burdensome procedures by transmission companies ; **W9**: Insufficient activity of various stakeholders **W10**: A sharp increase in the share of private cars in favor of public transport, respectively, increased emissions into the atmosphere; **W11**: Limited application of energy-saving measures and the use of renewable energy in the residential , industrial and transportation sectors .
OPPORTUNITIES	**THREATS**
O1: Installing systems using renewable energy ; **O2**: Introducing packages of energy efficiency measures in buildings and	**T1**: Uncertainty natural gas supply - lack of energy independence; **T2**: Rising energy prices; **T3**: High cost of renewable energy

industrial facilities; **O3**: Availability of financial mechanisms that support the implementation of energy efficiency measures and renewable energy sources ; **O4**: Control of energy consumption in public buildings; **O5**: Successful Partnerships - PPPs ESCO schemes and others . ; **O6**: Promoting the benefits and feasibility of renewable energy technologies in the residential sector, industry and transport; **O7**: Administrative and tax incentives at the local level of investment in green and energy-efficient technologies and industries ; **A8**: Promoting sustainable transport in urban environments; **O9** : the investments in environmentally friendly urban public transport and creating incentives for more widespread use ; **A10** : Build a network of bike lanes to facilitate movement of citizens as ecological , inexpensive and healthy way to travel ; **O11** : Available expertise to form a team for the generation, data analysis , planning, implementation and monitoring of measures for energy efficiency and use of renewable energy; **O12** : Exchange of experience and demonstration projects in the field of sustainable energy.	technologies; **T4**: The liberalization of the electricity market and the risks involved in selecting a provider of energy services; **T5**: Slow rate of biofuels usage in public and private transport; **T6**: Ongoing trend for import of old cars; **T7**: Difficulty in organizing residents in multi-family residential buildings to take action on the implementation of energy efficiency measures; **T8**: Mass use of less efficient appliances and equipment for heating in households; **T9**: Restart the industries with high potential for environmental pollution.

11. Energy goals of Asenovgrad Municipality

Reduction of CO_2 emissions in Asenovgrad Municipality - at least 28% by 2020
Reducing energy consumption in Asenovgrad Municipality - at least 20% by 2020

Share of renewables in the energy mix of Asenovgrad Municipality - at least 25% by 2020

Energy targets will be achieved through realization of projects un the following areas:

ENERGY EFFICIENCY

Specific objective	Measure / project	Period of performance	indicators	Source of information	Expected energy savings, MWh/ year	Expected emissions saved, tCO_2 / year	investments
Increasing energy efficiency in public sector	Conducting energy audits of buildings - municipal property	2013	An energy audit of all municipal buildings with area over 1000 m^2	Reports produced energy auditing reports on the implementation of the plans for EE acc. Article 12 of the EEA			10 200€

	Phased implementation provided in the reports of energy audits energy efficiency measures with a focus on educational and social infrastructure	2016	Energy savings Carbon emissions reduction	Reports on the implementation of plans for EE	7 700	2560	3 354 800€

Specific objective	**Measure / project**	**Period of performance**	**indicators**	**Expected energy savings, MWh/ year**	**Expected emissions saved, tCO_2 / year**	**investments**
Renovation of the street lighting in Asenovgrad	Preparation and implementation of a project for the repair of existing and construction of new energy efficient street lighting	2014	A survey of the existing system and drafted			7 670€
	Gradual establishment of an autonomous energy efficient street lighting in problem neighborhoods and sections	2017		3150	2173	9 546 453€

	Development of effective systems for maintenance and operation of street lighting, including citizen participation	2018		340	240	127 830€

Specific objective	**Measure / project**	**Period of performance**	**Expected energy savings, MWh/ year**	**Expected emissions saved, tCO_2 / year**	**investments**
Increasing the energy efficiency of public transport	Renewal of the bus fleet of public transport	2016	1980	510	278 672€
	Building a system of bicycle routes connecting major urban areas and major public spaces	2014	265	198,15	894 820€
	Optimization of the parking system by introducing the "Blue Zone" for paid parking in the city center	2014	180	134,60	102 265€

Specific objective	Measure / project	Period of performance	Expected energy savings, MWh/ year	Expected emissions saved, tCO_2 / year	investments
Activation processes in the complete renovation of residential buildings	Development and implementation of local financial mechanisms to support the implementation of energy efficiency measures in residential buildings	2016	23284	12801,93	157 000 000€
Raising public awareness and building a culture of energy efficient behavior in the domestic sector	Organizing and conducting awareness campaigns based on the principle of social marketing	2013 – 2020	115	78,55	10 230€
	Develop and implement a training program for school and school environments	2013 – 2020	125	85,38	7 670€
	Creation of Municipal Information Centre for Energy Efficiency	2013	90	61,47	7 670€
Total			**37 229**	**18 843,08**	**171 348 280€**

RENEWABLES

Specific objective	Measure / project	Period of performance	Expected energy savings, MWh/ year	Expected emissions saved, tCO_2 / year	investments
Promoting investments to build power plants and infrastructure in the municipality	Developing mechanisms for public-private partnership to build a renewable energy plant in the municipality	2014	7489	5114,99	3 834 944€
	Exploiting the potential of biomass in Asenovgrad Municipality	2013	18421	8833,35	4 090 606€
	Biogas from wastewater treatment plants	2014	3083,52	2106,04	843 687€
Support for changing energy behavior in business	Organizing information campaigns, conferences, business breakfasts, seminars and other meetings	2013	2250	1842,75	2 300 966€
	Administrative stimulate business and industrial use of renewable energy	2013	690	565,11	15 339€
Promote private investment in renewable energy	RES installations in the residential sector	2013	7145	4882,77	3 834 944€

	Photovoltaic parks in the municipality	2013	8452	5772,72	15 339 977€
	Photovoltaic parks in the municipality	2013 – 2014	-	384,25	1 022 651€
TOTAL			**47530,52**	**23 668,63**	**31 283 114€**

Specific objective	Measure / project	Period of performance	indicators	Source of information	investments
Mobilize public support for the implementation of the Action Plan "My City in 2020"	Prepare and conduct a public awareness campaign on the objectives of the SEAP of Municipality Asenovgrad 2012 -2020	2012 – 2020			10 226€
	Introduction of partnership mechanisms for monitoring, analysis and evaluation of progress in implementing the Action Plan "My City in 2020"				20 453€

Base year - 2007
Energy consumption in the base year - 183,718.274 MWh
Carbon dioxide emissions in the base year - 62,650.37 tCO_2
The assessment and analysis of average annual energy savings, CO_2 emissions and share of RES in the Municipality of town is made through expert.
SEAP of Asenovgrad Municipality has the main goal to become a tool for the implementation of municipal policies on energy efficiency and VEI.

12. Key success factors in the implementation of the Action Plan for Sustainable Energy Municipality Asenovgrad 2013 - 2020 г.

• Efficient distribution of key personnel and major financial resources for implementation of the Plan for sustainable energy development - the introduction of organizational changes and the formation of a structural unit for energy and climate change, initiating a program for staff development and the development of a common set of values and main objectives, timely launch of the first operational activities, including campaigning for challenges, priorities and planned activities for citizens and businesses, start the first projects for investment in infrastructure and public buildings.

• Develop detailed plans for energy efficiency investments: renovation of public buildings, improving energy efficiency in the private housing sector and others. Special attention should be paid to long-term financing options and the need for training of experts on financial engineering and the creation of energy managers in public buildings.

• Initiate dialogue with entrepreneurs - search for specific opportunities for development and implementation of major investment projects in energy efficiency and renewable energy sources, and preparation of the necessary flexible regulatory mechanisms to encourage private investment.

• Identifying and addressing critical bottlenecks in legislation on energy efficiency and planning initiatives for the national authorities to address them.

• Monitor progress closely - planning and launching new activities and initiatives where older are completed.

13.Financing opportunities

To identify the sources of funding to implement the objectives of the Action Plan for Sustainable Energy Municipality Asenovgrad into account the possibilities for ensuring their own funds from the municipal budget, attracting external resources in the currently available planning instruments, development of new forms of investment partnerships and the benefits of successful combinations of two or more sources of funding to ensure the sustainability of the achieved results.

Municipality own resources

Funding opportunities for energy efficiency investments in the municipal budget is limited to allocating funds to improve the energy performance of the educational and social infrastructure and street lighting. In the realization of large-scale investments and financing of integrated solutions the role of the municipal budget is complementary to the total amount of the required financial resources.

Operational Programme

Operational Programme "Regional Development 2007 - 2013"

Priority 1: "Sustainable and Integrated Urban Development"

Eligible activities under Operation 1.1.

Social infrastructure:

Eligible activities under Operation 1.2.

Housing:

Eligible activities under Operation 1.4.

Improving the physical environment and risk prevention:

Eligible activities under Operation 1.5.

Sustainable Urban Transport:

Eligible activities under Operation 2.3

"Access to sustainable energy":

Operation only supports investments in energy distribution and will support activities related to energy production. It will focus on the construction of gas distribution pipeline sections of the eligible regions and municipalities as part of the national gas grid.

Operational Programme "Environment" 2007 - 2013.

Eligible activities under Priority Axis 2
Improvement and development of infrastructure for waste treatment:
.INTERNATIONAL PROGRAMS AND INITIATIVES
The "eco-innovation"
Program "Intelligent Energy - Europe"
- **Energy efficiency and rational use of resources (SAVE)**
- **New and renewable energy sources (ALTENER) -**
- **Energy in transport (STEER) -**
- **Integrated Initiatives -**http://ec.europa.eu/energy/intelligent/index_en.html

JASPERS (Joint Assistance in Supporting Projects in European Regions)
JESSICA (Joint European Support for Sustainable Investment in City Areas).

CREDIT LINES

Credit line for energy efficiency and renewable energy

sources for Bulgaria (BEERECL)**Credit line for energy efficiency in buildings (REECL)**
www.reecl.org

Credit line from the European Investment Bank (EIB) for energy

efficiency in Bulgaria

Energy Efficiency Fund

www.bgeef.com

NCEF
• Elimination of contamination that occurred in the past;
• Reduction of air pollution;
• Clean water protection;
• Protection of biodiversity.www.ecofund-bg.org
FORMS OF PUBLIC PRIVATE PARTNERSHIP
Contracts "turnkey"
ESCO contracts

14. Monitoring indicators, feedback

After the expiry of the implementation of the Plan is necessary to recognize the results, using the data from the monitoring of performance. The performance evaluation is done by comparing the results with data on baseline and baseline scenario.

Definition of indicators to assess the results of the implementation of the plan is crucial to the ultimate success and the practical benefits of monitoring. Basic requirement in terms of indicators is that they are clear and measurable, which is a prerequisite for their objective reporting.

Possible indicators are:

• volume of the investments (thousand Levs);

• energy savings (in absolute terms - kWh) or reduced energy consumption (expressed as a percentage);

• Specific energy consumption (kWh/m2 floor area of the building or kWh / capita);

• level of comfort (temperature of the premises or degree of illumination of premises or streets);

• amount of emission reductions (in absolute terms - tCO2 or percent reduction compared to previous issues);

• insulated floor area of buildings (in absolute terms - m2 or to population - m2/zhitel);

• rate of return on the investments (as the value of the rate of return - IRR or payback - PB);

• unit costs of energy savings and reduced emissions (lev / kWh of energy saved or lev / t CO2 emission reductions).

Municipal Energy Plan is open to new activities or changes in activities within the project that may be required in the process of implementation and control.