SUSTAINABLE ENERGY ACTION PLAN OF THE CITY OF TIRANA (SEAP)

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CONTENT

LIST OF FIGURES

LIST OF TABLES

1 Introduction

1.1 An overview of Covenant of Mayors initiative

At the end of January 2008, the European Commission initiated the linking of the mayors of European sustainable energy cities into a permanent network with the goal to share experiences in the implementation of efficient measures for the improvement of energy efficiency in urban environments. The Covenant of Mayors is a response of leading European cities to the challenges of the global climate change, and at the same time, it is the most ambitious initiative of the European Commission, directly oriented towards active involvement and continuous participation of city administrations and the citizens themselves in the struggle against global warming. By signing the Covenant, the mayors commit to apply numerous measures of energy efficiency, which will in the end lead to the reduction of CO_2 emissions in their cities by more than 20 % by 2020, as required by the Proposal of the European Energy Policy from 2007.

The roles of the city administration which direct the work of city departments, institutions and companies owned or partially owned by the city, defined by the Covenant of Mayors, are as follows:

- Implementation of measures, projects and programs of energy efficiency, in public buildings, owned or rented by the city;
- Implementation of measures, projects and programs, aimed at the increase of energy and environmental efficiency, in the sector of the city public transport;
- Implementation of measures, projects and programmes of energy efficiency in the city public lighting sector;
- Planning of development of the cities on the principle of energy-environmental sustainability,
- Implementation of continuous activities and campaigns on the modes of increase of energy efficiency and reduction of CO_2 emissions, in order to raise the awareness of citizens on the necessity of saving energy in all fields of life and work;
- Support to the programmes and initiatives of different natural and legal persons with the aim of increasing the use of renewable energy sources.
- Promotion of local production of energy from renewable sources and co-generation.

The Covenant also defines the concrete obligations of signatories:

- Development of the Baseline Emissions Inventory (BEI - hereinafter inventory) as a basis for the development of Sustainable Energy Action Plan-SEAP (hereinafter Action Plan),
- Development and implementation of the SEAP;
- Control and monitoring of the implementation of the SEAP;
- Submission of the report on the realization of the Action Plan to the European Commission biennially;
- Harmonization of the structure of the city administration with the aim of providing necessary expert potential for implementation of the Action plan;
- Regular informing of local media on the results of implementation of the Action Plan;
- Informing of citizens on the possibilities and advantages of using energy effectively;
- Organizing Days of Energy or Days of Covenant of Cities events, in cooperation with the European Commission and shareholders;
- Participation and contribution to annual Conferences of EU Mayors on Energy Sustainability in Europe;
- Exchange of experiences and knowledge with other cities and municipalities.

By the beginning of May 2013, The Covenant was signed by 4 526 cities (number of inhabitants – 166 805 701), and the interest of other cities for joining is extremely high. It is interesting to note that the initiative spread beyond European borders and expanded to the entire world. Apart from more than 4500 European cities, the Covenant was also signed by the Mayors of municipalities of Argentina, New Zealand, Armenia, Palestinian Territories, Morocco, etc. From the European countries, the most numerous cities members come from Italy (2189) and Spain (1285).

Figure 1.1 Ceremonial signing of the Covenant of Mayors held on November 29, 2011 in the Great Hall of the European Parliament in Brussels

1.2 Covenant of Mayors initiative in year 2013

The Covenant of Mayors is an ever-improving initiative, constantly adapting its methods and processes based on the feedback provided by its growing community. Over the past few months, the Covenant of Mayors Office (CoMO) and Joint Research Centre (JRC) of the European Commission have been particularly active in revising and enhancing the procedures in place, notably to better echo the needs of signatories.

The Covenant of Mayors Office resolutions for year 2013 are the following:

- Showing Performance Indicators
- Enhancing the online platform and simplifying administrative procedures
- Ensuring a transparent process
- Simplifying the online reporting
- Ensuring quicker feedback - online, on time!
- Making it easier to monitor progress
- Providing country-specific guidance

The existing 'Covenant in Figures' webpage will be completed with further figures and performance indicators (e.g. average CO_2 reduction target; expected energy savings and CO_2 emissions reduction by 2020 by key sector) to show at a glance the impact of the Covenant initiative as a whole.
The Covenant Extranet will continue being regularly improved with more automated features. For example, an extension of the SEAP submission deadline can now be requested through a specific form available under the signatories' and coordinators' profiles. The rules to grant such extensions have also been redefined.

The information on whether or not signatories are respecting their commitments is publicly available under their individual profiles and on the Covenant extranet. A new status will be shortly added, identifying Signatories that are late in the process and therefore temporarily "on hold".
The Covenant of Mayors Office continuously seeks to enhance and improve the ergonomics of the Extranet, to ease the SEAP submission process and minimize signatories' constraints/ difficulties. The objective is to progressively revamp the interface, integrating interactive, flexible and easy-to-use reporting features. The SEAP template itself will also be subject to slight revision. Other such improvements are to follow shortly.

The Covenant of Mayors Office understands the need for a more efficient SEAP evaluation process and the provision of a prompt and valuable feedback to signatories. It is a long and tedious work, but in progress! In a few months, the system will perform real-time completion and data consistency checks. The objective is to quickly detect any validation errors. First results will be presented in a user-friendly and concise manner to signatories in a "pre-feedback report", mainly through notifications and graphical elements. This will help them to check at a glance if the SEAP template meets all the Covenant requirements.

The reporting process to monitor the implementation of Sustainable Energy Action Plans (SEAPs) is currently being developed by both the CoMO and JRC. This reporting procedure will be facilitated by an online template (similar to the one which is used as part of the SEAP submission process), and accompanied by a comprehensive instruction document. A selected group of practitioners (composed of energy experts active as Covenant Signatories, Coordinators or Supporters) has been invited to take part in the development process and make sure the new template best responds to signatories' needs. The monitoring template and instructions should be officially published in the first half of 2013.

CoM office already liaises with a pool of national experts to further decentralize the helpdesk operations and ensure greater consistency with national and regional processes. Thanks to their involvement, country-focused leaflets for Austria, Hungary, Czech Republic, Slovakia and Poland will be shortly published (both in English and the national language) to provide a more in-depth overview of the national context/energy policies and better promote successful examples, supporting methodological tools, and financial sources available in each country. More leaflets will follow, thanks to the voluntary contribution of active supporters.

1.3 What is the Sustainable Energy Action Plan of the City?

Sustainable Energy Action Plan (SEAP) is the main document, which on the basis of collected data on the current situation, identifies and provides precise and clear guidelines for the implementation of projects and measures of energy efficiency and use of renewable sources of energy at the city level, which result in the reduction of CO_2 emissions by more than 20 % by the year 2020.

By signing the Covenant, the Mayors commit to the development of the Sustainable Energy Action Plan, which must be submitted to the European Commission within the period of one year.

The key goals of the development and implementation of the Action Plan are:

- Reduction of the CO_2 emissions in the sectors of building, transport and public lighting through the implementation of energy efficiency measures, through the use of renewable sources of energy, management of consumption, education, etc;
- Maximal contribution to the security and diversity of city's power supply;
- Reduction of consumption of energy in the building, transport and public lighting sectors;
- Increase of the share of power obtained from renewable sources;
- Enabling the transformation of urban areas into ecologically sustainable areas.

The Action Plan focuses on the long-term transformations of power systems within cities, and provides measurable goals for reduction of energy consumption and accompanying emissions of CO_2.

The obligations from the Action Plan are applicable to the entire city area, including public and private sectors. The Plan defines the measures and activities in the building, transport and public lighting sectors, excluding the sector of industry. The Action Plan in all its segments must be in line with the institutional and legal frameworks at the EU, national and local levels, and cover the period up to 2020.

The European Commission prepared the Handbook: *How to develop the Sustainable Energy Action Plan* (Figure 1.2) with the aim to assist the city administration in its preparation and implementation, as well as to compare the achieved results in various European cities.
During the implementation of the Action Plan, the cities will submit to the European Commission, the reports on the implementation and progress in the realization of foreseen goals. A special report form was conceived for this purpose.

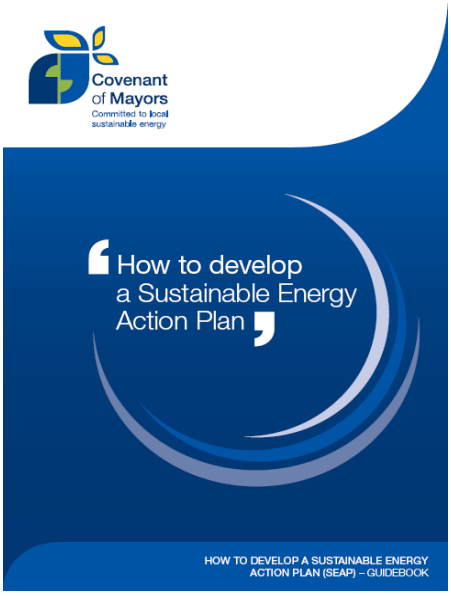

Figure 1.2 SEAP Tirana has been developed according to EC Handbook

2 Methodology

2.1 Development, implementation and monitoring of the Sustainable Energy Action Plan of the City of Tirana

The process of implementing and monitoring of the Sustainable Energy Action Plan of the City of Tirana (hereinafter referred to as the Process) can be divided into six main steps:

1) Preparatory activities for the Process (political will, coordination, professional resources, participation etc.);
2) Developing the Sustainable Energy Action Plan for the City of Tirana (hereinafter referred to as the Action Plan);
3) Adopting the Action Plan as an official implementing document for the City of Tirana;
4) Implementing the identified measures and activities according to the Priority Measures and Activities Plan and in line with the determined time frame and schedules;
5) Monitoring and controlling the implementation of identified measures according to the Priority Measures and Activities Plan;
6) Drafting a report on implemented projects from the Priority Measures and Activities Plan every two years.

There are a large number of activities within these six steps that should be implemented in order to successfully carry out the Process.

2.1.1 Preparatory activities for the Process

The main activity in the preparatory phase of the process is to achieve the political will necessary for its initiation and realisation. The support of the Mayor is essential for the successful realisation of the Process. The signing of the Covenant of Mayors demonstrates that the city administration understands the importance of sustainable energy development for the City of Tirana, but this is only the first step in the right direction. Other steps must follow, the most important of which is the allocation of the required human and financial resources. Decision-makers in the city administration must be involved in the Process from the very beginning, namely from the signing of the Covenant. They are the ones that can and should give support to all stages of the Process, because successful implementation is only possible with their full support.
The City administration has the following tasks in the implementation of the Action Plan:

- Successfully integrate the objectives and measures from the Action Plan in the development strategy for the City of Tirana;
- Allocate the professional staff required for implementation of identified measured relating to energy efficiency and renewable energy sources;
- Allocate financing means for measures implementation;
- Support the continuous implementation of measures throughout the Action Plan implementation period until 2020;
- Secure monitoring and reporting on realisation of the implementation plan until 2020;
- Continuously inform citizens on Plan implementation;
- Secure participation of all stakeholders and interested citizens in the whole process, from Action Plan development through implementation;
- Active involvement in the network of signatories to the Covenant of Mayors, for the purposes of a continuous exchange of good practices and joint cooperation in building sustainable urban areas in Europe.

The successful completion of the process comprising the development, implementation and monitoring of the Action Plan will benefit the City of Tirana and its citizens, but also strengthen the political power of the city administration, which, through the successful implementation of the whole process, will:

- Demonstrate its dedication to a sustainable energy development of the City of Tirana and to the principles of environmental protection, energy efficiency and renewable energy sources as the pillars of sustainability in the 21 century;
- Lay down the foundations for a sustainable energy development of the City of Tirana;
- Initiate new financing mechanisms for implementation of energy efficiency measures and use of renewable energy sources in the City of Tirana;
- Guarantee the long-term security of energy supply for the City of Tirana;
- Improve the citizens' quality of life (improve air quality, reduce traffic congestion etc.).

From the successful Action Plan development and implementation will directly or indirectly benefit all citizens of the City of Tirana; the citizens will have the opportunity to participate in all implementation phases through the representatives of various interest groups (stakeholders).
The involvement of as much stakeholders as possible is the first step in the process of changing citizens' positions and behaviour regarding energy. By signing the Covenant of Mayors, the City of Tirana has undertaken the obligation of ensuring citizen involvement in the development and implementation of the Action Plan.
The process of developing and implementing the Action Plan should involve all those:

- whose interest are in any way connected with the Action Plan;
- whose activities in any way impact the Action Plan;
- whose ownership, access to information, resources, expertise etc. are necessary for successful Action Plan development and implementation.

The first step is to identify the actors, and the next step is to define their specific roles in the Action Plan development, implementation and monitoring process.

2.1.2 Development of the Sustainable Energy Action Plan of the City of Tirana

The Sustainable Energy Action Plan of the City of Tirana comprises ten main activities:

1) Determine the time frame for Action Plan implementation;
2) Classify energy consumers in the City of Tirana into sectors;
3) Analyse energy consumption by sectors;
4) Determine priority sectors for action, based on energy consumption analysis results;
5) Develop a Baseline CO_2 Emissions Inventory (BEI);
6) Develop a plan of priority activities and measures aimed at achieving the CO_2 emission reduction targets by the year 2020;
7) Determine the implementation schedule for the Priority Activities and Measures Plan;
8) Determine financing mechanisms for implementation of the Priority Activities and Measures Plan;
9) Establish the legal framework for implementation of the Priority Activities and Measures Plan;
10) Set energy consumption and CO_2 emissions reduction targets.

The first activity in the development of the Sustainable Energy Action Plan for the City of Tirana is to determine the time frame for implementation, i.e. to determine the baseline year, for which the Baseline CO_2 Emissions Inventory will be prepared. Timeframe for Action Plan implementation is the period between the baseline year and year 2020. A Priority Activities and Measures Plan must be

elaborated for this period, the implementation of which should result in the achievement of set CO_2 emissions reduction targets.
The European Commission recommends that 1990 should be taken as the baseline year, if the city has the required information on energy consumption and CO_2 emissions. If the city does not dispose of the required data for 1990, the recommendation is that the baseline year should be the first year, for which the city has the required data available. Since the City of Tirana does not dispose of the required data for previous years, 2011 was selected as the baseline year, and a Baseline Emissions Inventory shall be prepared for this year for the sectors buildings, transport and public lighting.

A key element of the Action Plan is the CO_2 emissions reduction targets for the city for the year 2020. The Action Plan should also include CO_2 emissions reduction targets by energy consumption sectors and subsectors on the territory of the City of Tirana.
With the aim of setting realistic energy saving and CO_2 emissions reduction targets for the year 2020, it is important that reliable data on energy consumption for the baseline year are collected, and the first step towards this goal is the classification of energy consumption sectors in Tirana.In line with European Commission recommendations, consumers in the city are categorised in three energy consumption sectors:

- Buildings;
- Transport;
- Public lighting.

The buildings sector is subdivided in the following three subsectors:

- Buildings owned by the City of Tirana;
- Commercial and service sector;
- Residential buildings.

The transport sector comprises three subsectors:

- Vehicle fleet owned by the City of Tirana;
- Public transport in the City of Tirana;
- Private and commercial vehicles.

The public lighting sector consists of the public lighting electricity grid on the territory of the city.
A key step in analysing sector and subsector energy consumption is collecting reliable data which, due to the complexity of the city's energy infrastructure system, is a very complex task in the City of Tirana.
Regarding the buildings sector, data on the following must be collected for all subsectors for the year 2011:

- Buildings number and characteristics;
- Electricity consumption;
- Heat consumption from the district heating system;
- Consumption of other heating fuels (gas, oil, firewood etc.).

The following are the data required for energy consumption analysis in the transport sector for the year 2011:

- Structure of the fleet owned by the City of Tirana according to fuel type;
- Structure and characteristics of public transport in the City of Tirana;
- Number and type of registered private and combined-use vehicles;
- Consumption of various fuel types for the fleet owned by the City of Tirana;
- Consumption of various fuel types for bus transport in the City of Tirana.

Based on the number and type of registered private and combined-use vehicles, the mileage and the consumption of various types of fuel will be estimated.

The following data are required for the analysis of energy consumption for public lighting in the City of Tirana:

- Structure and characteristics of the public lighting network (lamps number, type and characteristics, distance between lampposts etc.);
- Electricity consumption.

Based on the results of the energy analysis, priority action sectors will be selected that will receive special attention on the whole Process of developing, implementing and monitoring the Action Plan.
Reliable input data are a requirement for a successful energy consumption analysis in the various sectors and subsectors, and the analysis results will be inputs for the Baseline CO_2 Emissions Inventory; the systematic data collection and processing is one of the most important, if not the most important activity in the development of the Action Plan.
The next important activity of the Action Plan is the preparation of the Baseline CO_2 Emissions Inventory for the City of Tirana, which will be developed in line with the IPCC Protocol. The Intergovernmental Panel on Climate Change (IPCC) is the implementing body of the United Nations Environment Programme (UNEP) and the World Meteorological Organisation (WMO) for the implementation of the United Nations Framework Convention on Climate Change (UNFCCC).
By ratifying the Kyoto Protocol on 01 April 2005, the Republic of Albania undertook the obligation of monitoring and reporting on greenhouse gas emissions in the atmosphere according to the Kyoto Protocol; therefore the Kyoto Protocol, as a nationally ratified protocol, is used as the basis for development of the Baseline CO_2 Emissions Inventory for the City of Tirana.
Based on the CO_2 emissions data for the various energy consumption sectors and subsectors in the city, the energy analysis for 2011, the energy balances for the previous several years, the energy consumption forecast for the period until 2020, as well as on the basis of numerous other factors (Urban development plan of the City of Tirana, development strategy etc.), measures and activities were identified aimed at increasing energy efficiency and the use of renewable energy sources, which are comprised in the Priority Measures and Activities Plan (hereinafter referred to as the Plan).
In order to identify the measures and activities, the implementation of which may result in significant CO_2 emissions reduction by 2020 with satisfactory economic and energy parameters, the following aspects shall be elaborated in the Plan:

- Potential energy savings by 2020;
- Timeframe and implementation schedule;
- Financing opportunities;
- Implementation costs;
- Potential CO_2 emissions reduction by 2020.

One important aspect of the Action Plan is its harmonisation with the legislative framework. All proposed measures and activities must be harmonised with the relevant legislation of the City of Tirana, the Republic of Albania and the European Union. The last step in the development of the Action Plan is setting a realistic CO_2 emissions reduction target for 2020 on the basis of all previous activities carried out in the City of Tirana.

2.1.3 Adopting the Action Plan as an implementing document of the City of Tirana

Adopting the Action Plan as an official binding document of the City of Tirana is essential for its implementation and for the achievement of the CO_2 emissions reduction target for year 2020. Therefore, it is of paramount importance that decision-makers in the city administration are involved in the Process of developing, implementing and monitoring the Action Plan from the very beginning; on the other hand, one of the first steps should be the establishment of an Energy Council, as a body

that will monitor and evaluate the Process. After the Energy Council has adopted the Action Plan as a technically sound and practically enforceable document, the city administration shall proclaim it an official binding document, which is a prerequisite for its implementation. In the case of the City of Tirana this shall mean adoption of the Action Plan by the Tirana City Council.

2.1.4 Implementation of the Plan of Priority Measures and Activities for the City of Tirana

Implementation of identified energy efficiency measures, an activity that will result in the CO_2 emissions reduction target of more than 20% by 2020, is the most difficult stage of the Process of developing, implementing and monitoring the Action Plan, an activity that requires the most time and effort, as well as significant financial resources. The Action Plan development phase ends with the development of the Priority Measures and Activities Plan, which contains the identified energy efficiency measures, the proposed timeframe and implementation schedule, the potential energy savings, as well as the corresponding CO_2 emissions reduction. The adoption of the Action Plan as an official document of the City of Tirana marks the beginning of its implementation, a very complex process that depends on various economic, social and technical factors and requires extremely good organisation and cooperation between many stakeholders in the city.
First Action Plan implementation step is to establish a Working Group for Action Plan Implementation (hereinafter referred to as the Working Group) and to appoint a chairperson. Main task of the working group is to coordinate the Action Plan implementation process. First requirement for successful coordination is to draft and implement an effective communications strategy on two levels. On the first level, a continuous flow of information must be secured between the various city offices, services and departments, i.e. between all entities involved in the implementation of energy efficiency projects and the persons responsible for project implementation according to the Plan (designers, developers etc.). On the second level, information on all activities during Plan implementation must be communicated to citizens and stakeholders. Good communication and the appropriate professional experience and skills of the working group members are essential for successful Action Plan implementation.

2.1.5 Control and monitoring of Action Plan implementation

The Action Plan implementation control and monitoring phase should run on several levels concurrently:

- Monitor the implementation schedule for individual energy efficiency measures in the Priority Measures and Activities Plan;
- Monitor implementation performance of projects from the Plan;
- Monitor and control set energy savings targets for each individual measure in the Plan;
- Monitor and control achieved CO_2 emissions reductions for each individual measure in the Plan.

The Energy Council shall monitor the implementation schedule and performance of the Priority Measures and Activities Plan. Should the need arise due to high work load, the Energy Council may establish a Supervisory Group for Monitoring and Control of Action Plan Implementation.
One method for successful monitoring of energy savings achieved in the various sectors and subsectors, as well as for achieving set CO_2 emissions reduction targets, both for individual measures and for the Plan in general, is to draft a new CO_2 Emissions Inventory for the City of Tirana. According to European Commission recommendations, the best results from the whole Process of developing, implementing and monitoring the Sustainable Energy Action Plan of the City of Tirana would be

achieved if a new CO_2 Emissions Inventory is drafted every two years; it is important that the methodology used in the drafting is same as the one used for the Baseline CO_2 Emissions Inventory for the year 2011. Only the use of an identical methodology makes comparison possible and answers the question of whether set CO_2 emissions reduction targets are being met. Even better results would be achieved if the drafting of the new Emissions Inventory is followed by the development of a new Action Plan that would contain analysis of achieved results (implemented measures, achieved savings, reduction in CO_2 emissions), as well as a new Priority Activities and Measures Plan based on specific results and data from the CO_2 Emissions Inventory for one of the next years (2013 or 2015). It is important that the same methodology is used for the development and updating of the existing Action Plan, so that results would be comparable.

2.1.6 Reporting on results of Action Plan implementation

By signing the Covenant of Mayors, cities are obliged to develop a Sustainable Energy Action Plan and to continuously inform the European Commission on implementation progress and efficiency every two years. The European Commission prepared and published templates for entry of Action Plan main parameters (responsible person, energy consumption and CO_2 emissions according to the EC sectors classification, identified energy efficiency measures, set targets etc.). Since the Action Plan primarily applies to large cities and represents a comprehensive document, the evaluation of which takes up considerable time, it does not have to be submitted to the European Commission. It is sufficient to submit the templates, which the European Commission will evaluate and send the responsible person in the city administration official feedback and Action Plan improvement recommendations.

2.2 Organisational structure of the process for developing, implementing and monitoring the Sustainable Energy Action Plan of the City of Tirana

2.2.1 Working and Supervisory Bodies for the Process of SEAP Implementation

The Process of Developing, Implementing and Monitoring the Sustainable Energy Action Plan for the City of Tirana is an exceptionally complex task that poses many challenges to all persons involved. The Sustainable Energy Action Plan for the City of Tirana is the first programme of its kind being developed in the Republic of Albania. Despite the fact that the European Commission has prepared guidelines for the whole Process, it is up to the city administration to adjust these guidelines to city specifics, which is not a simple task. Furthermore, the City of Tirana, as the Albanian capital, is under pressure to ensure that the quality and success of the Process will serve as an example for other Albanian cities on their path towards sustainable urban development.

The main prerequisite for a successful process is to build an effective organisational structure, so that it would be clear from the very beginning that should do what, how and when. Due to the Process complexity, on one hand, and due to the significance and size of the City of Tirana, as the Albanian capital, on the other, and with the aim of involving as many stakeholders in the Process as possible, it is of utmost importance to establish the working and supervisory bodies and to determine their tasks at the very beginning.

The first step towards building the organisational structure for Process implementation is to appoint the coordinator. The Process Coordinator is the key person for the whole Process, who shall make all important decisions after appointment and propose all working and supervisory bodies required for implementation of the main steps in the Process. This Action Plan recommends that the Process

Coordinator should be the Head of the city authority tasked with local economic development, energy and energy efficiency.
Supervisory and working bodies that should be established according to the Process steps are as follows:

- Energy Council;
- Working Group for Implementation of the Priority Measures and Activities Plan.

The Energy Council is the supervisory and advisory body that should be established at the beginning of the Process. With the aim of facilitating communication and Process monitoring, it is recommended that the Process Coordinator should be the Energy Council Chairperson. The Energy Council should consist of representatives of city administration and main Process participants.

Main tasks of the Energy Council shall be to:

- Monitor all phases of the Action Plan development, implementation and monitoring Process;
- Communicate with stakeholders and citizens;
- Review the Action Plan;
- Recommend to the city administration that the Action Plan should become an official, binding document for the City;
- Monitor operations of the Working Group for Implementation of the Priority Measures and Activities Plan;
- Monitor and control the implementation of the Priority Measures and Activities Plan;
- Report periodically to the city administration on the results of the Action Plan development, implementation and monitoring process;
- Review the Report to the European Commission on the results achieved through Action Plan implementation;
- Adopt the Report to the European Commission on the results achieved through Action Plan implementation.

It is recommended that the Energy Council of the City of Tirana should comprise representative of the following institutions:

- Scientific and education institution from the energetic field,
  From Tirana Universities, etc.
- City authority of city Tirana,
- Non-governmental associations,
- AKBN (National Agency of Natural Resources),
- Energy Efficiency Centre AL-BE.

Apart from the representatives of the aforementioned institutions, the Energy Council of the City of Tirana should be open to distinguished experts in the field of energy with long experience in one of the following areas:

- Energy, energy efficiency and RES;
- Civil engineering, urban development and spatial planning;
- Utilities;
- Traffic and transport.

The Working Group for Implementation of the Priority Measures and Activities Plan is a working body primarily responsible for initiating and coordinating the implementation of specific projects and measures for energy efficiency, use of renewable energy sources and environmental protection, in line with the Plan implementation schedule. It is important that the working group chairperson is a distinguished expert with long experience in managing large energy efficiency projects. The working

group should be established during the Action Plan development phase, so that Plan implementation may commence very soon after it is adopted as an official document.
Due to the high expected workload, it is recommended that all preparatory activities for establishment of the Working Group should be undertaken as soon as possible.

The Working Group shall:

- Manage and coordinate the implementation of the Priority Measures and Activities Plan;
- Establish a communications strategy;
- Manage calls for bids for the elaboration of technical documentation for measures and projects from the Plan;
- Manage calls for bids for the performance of works related to the projects and measures in the Plan;
- Manage calls for bids for the procurement of equipment necessary for the projects and measures in the Plan;
- Manage the projects and measures in the Plan;
- Prepare periodical reports on Plan implementation results.

2.2.2 Stakeholders identification and involvement

The greatest possible number of stakeholders should be involved in the Action Plan development and implementation process from the very beginning; this can be achieved through a successful communications strategy, and the first step is to identify those stakeholders.

Stakeholders in the City of Tirana can be divided into the following categories:

- Units of local self-governments;
- Municipal services and public enterprises;
- Commercial companies established by the city;
- Businessmen/ chambers of commerce;
- Association of Tirana taxi driver;
  Tirana Public Transportation Association;
  Engineers associations;
- Universities in Tirana;
- Other educational institutions;
- Non-governmental organisation;
- Consumers associations.

City government consist of offices as follows:

Mayor`s office (Mayors and 2 vice Mayors and Director of cabinet)
General Secretary
5 General Directorates as follows:

1. General Directorate of Policy Development and City Promotion
   Department of Social Care
   Departments of Art and Culture
   Department of Youth and Sports
   Department of Tourism and City Promotion
   Department of Policy and Environmental Education
   Department of Economic Development
   Department of Employment Policies

2. General Directorate of Planning and Management Services
   Department of Planning Services
   Department of Infrastructure Services Management
   Department of urban and Solid Waste Management
   Department of Transport and Mobility
   Department of Projects and Engineering Networks
   Department of Housing and Social Service Management
   Department of Enterprise Monitoring
3. General Directorate of Foreign Investment and Strategic Projects
   Department of Strategic Projects
   Project Management Unit
   Department of Foreign Investment Promotion
4. General Directorate of Planning and Territorial Development
   Directorate of Territorial Planning
   Department of Territory Development Control
5. General Directorate of Support Services
   Legal Department
   Department of Human Resources and Services
   Department of Finance

The City of Tirana has a total of 11 local municipal units.
Municipal companies are the following:

1. General Directorate of City Workers Nr. 1
2. General Directorate of City Workers Nr. 2
3. General Directorate of City Workers Nr. 3
4. Directorate of High School Dormitories
5. Tirana City Economic Development Centre and Children's Education

As for educational institutions on the territory of Tirana there are 76 kindergarten, 57 elementary schools, 14 high schools and 5 dormitories for high schools students. In Tirana there are also 4 public universities, 2 student centres and a large number of private schools, universities and dormitories.

3 Analysis of energy consumption in the building sector of the City of Tirana

For the needs of energy consumption analysis, the buildings sector of the City of Tirana is divided into the following subsectors:

- Buildings owned by the City;
- Residential buildings (households);
- Commercial and service buildings.

Relevant data for the energy consumption analysis in the buildings sector are collected from the following sources:

- National Energy Strategy 2011;
- National Energy Balance 2011;
- National Institute of Statistics;
- Municipality;
- Study on the Heating of the Public Buildings in Albania - National Agency of Energy, 2004;
- Feasibility Study for Heat and Power in University Hospital Center Mother Theresa - Dansk Energy Management, 2002;
- Feasibility Study for Heat and Power in Student City - Dansk Energy Management, 2002;
- Data from Power Distribution Company (CEZ) for power consumption according to different consumer categories in 2011.

Based on the collected data, the following parameters are given for the building all individual building subsectors in the City of Tirana:

- General information on the subsector;
- Total area of the subsector (m^2);
- Number of buildings in the subsector;
- Total consumption of electric energy in the subsector (kWh);
- Specific consumption of electric energy in the subsector (kWh/m^2);
- Consumption of electric energy for heating in the subsector (kWh/m^2);
- Total consumption of firewood (m^2);
- Specific consumption of firewood in the subsector (kWh/m^2);
- Total consumption of fuel oil (t);
- Specific consumption of fuel oil (kWh/m^2);
- Total consumption of heating energy in the subsector (MWh);
- Specific consumption of heating energy in the subsector (kWh/m^2).

3.1 Analysis of energy consumption of subsector Buildings owned by the City of Tirana in 2011

The subsector of buildings owned by the City of Tirana is divided into the following categories:

- Educational institutions;
- Cultural institutions;
- City administration buildings and business facilities;
- Other public buildings.

Division into the mentioned categories was done in order to get the best and the most precise insight into the actual thermal (heating and cooling) and electrical energy consumption in the subsector buildings owned by the City of Tirana.

3.1.1 Educational buildings

According to General directorate Nr.3 of city workers, educational buildings in the City of Tirana are divided into three categories:

- Primary schools – 57 objects, total area 155 676 m^2;
- Kindergartens – 75 objects, total area 36 478 m^2;
- Secondary schools and dormitories – 20 objects, total area 240 961 m^2.

Total number of educational buildings is 152 with total area of 240 961 m^2.
The total electricity consumption in educational buildings in 2011 was 5 058 295 kWh, which gives the specific consumption of 20,99 kWh/m^2.

Table 3.1 shows parameters for thermal energy consumption per energy type in the category of educational buildings.

Table 3.1 Parameters for thermal energy consumption

Energy source	Total heated floor area (m^2)	Thermal energy consumption (kWh)	Specific consumption (kWh/m^2)
Diesel	76 582	4 674 216	61,04
Electricity	164 379	7 627 224	46,40
Total	240 961	12 301 440	51,05

The comparisons of specific consumption of electrical and thermal energy are presented in figures 3.1 i 3.2.

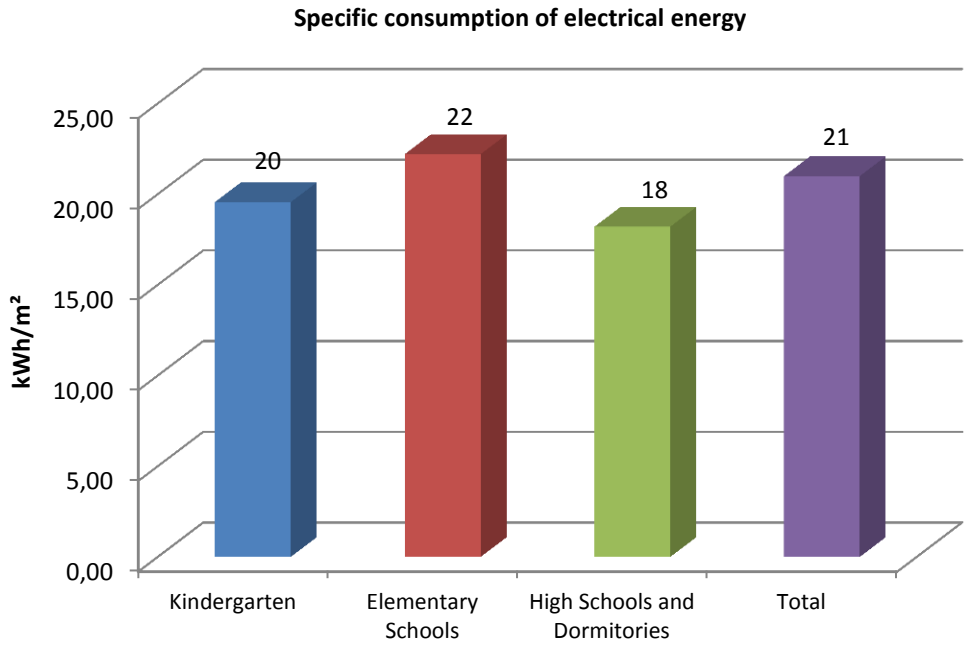

Figure 3.1 Specific consumption of electrical energy

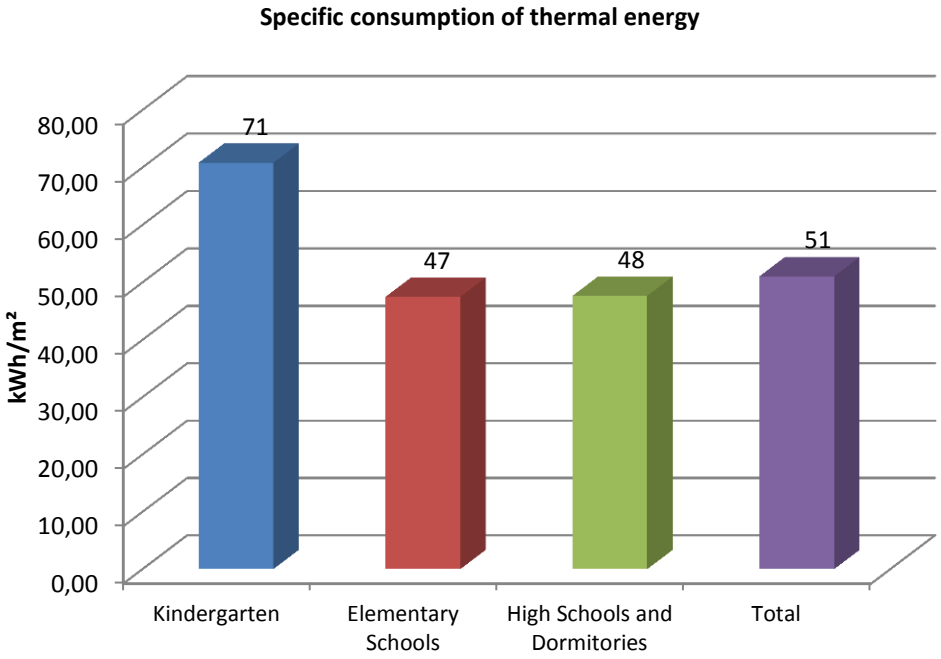

Figure 3.2 Specific consumption of thermal energy

From the conducted energy analysis of the educational buildings, it can be concluded that the heat consumption is expected and typical for educational facilities in Albania. The reason for this lies in the fact that all educational buildings owned by the City are heated not more than 4 hours a day. By comparing the average specific heat consumption, it was observed that kindergartens have greater consumption so the recommendation is to conduct detailed energy audits to detect and successfully remove the causes of high consumption.

The average specific electricity consumption of this building category is expected for objects of related purposes in Albania. Nevertheless, there is potential for electricity savings in this category that cannot be ignored.

3.1.2 Cultural institutions

The following buildings belong to category of cultural institutions, total area of 710 m^2:

- Zyra e Turizmit, total area 70 m^2;
- Teatri i Metropolit, total area 190 m^2;
- Cirku i Tiranes, total area 110 m^2;
- Tirana Sport Club, total area 340 m^2;

The total of 30 987 kWh of electricity was spent in the category of cultural institutions in 2011, which gives a specific electricity consumption of 43,64 kWh/m^2.

All buildings for cultural purposes used electricity as heating source. Table 3.2 shows parameters for thermal energy consumption in the category of cultural institutions.

Table 3.2 Parameters for thermal energy consumption in cultural institutions

Energy source	Total heated floor area (m^2)	Thermal energy consumption (kWh)	Specific consumption (kWh/m^2)
Electrical energy	710	72 303	101,84
Total	710	72 303	101,84

Based on conducted energy analysis of the cultural buildings, it can be concluded that the heat consumption is expected and typical for cultural facilities in Albania.

Specific thermal consumption of Teatri i Metropolit (134,18 kWh/m^2) and Zyra e Turizmit (126,40 kWh/m^2) are high and it is necessary to determine the causes of increased energy consumption. For this reason it is recommended to conduct a detailed energy audit of the building to detect appropriate measures to increase energy efficiency.

3.1.3 City administration buildings and business facilities

Data on energy consumption of City administration buildings and business facilities include 12 administration buildings with a total area of 8 640 m^2 and 9 objects of business facilities total area of 5 650 m^2. It should be noted that all buildings use electricity as heating source.

This category spent a total of 827 934 kWh of electricity in 2011 which gives the specific consumption of 57,94 kWh/m^2.

Table 3.3 shows the parameters of thermal energy consumption by fuel in the category of administrative building and business facilities.

Table 3.3 Parameters of thermal energy consumption

Energy source	Total heated floor area (m^2)	Thermal energy consumption (kWh)	Specific consumption (kWh/m^2)
Electrical energy	14 290	1 931 846	135,19
Total	14 290	1 931 846	135,19

The comparison of specific consumption of electrical and thermal energy is presented in figure 3.3.

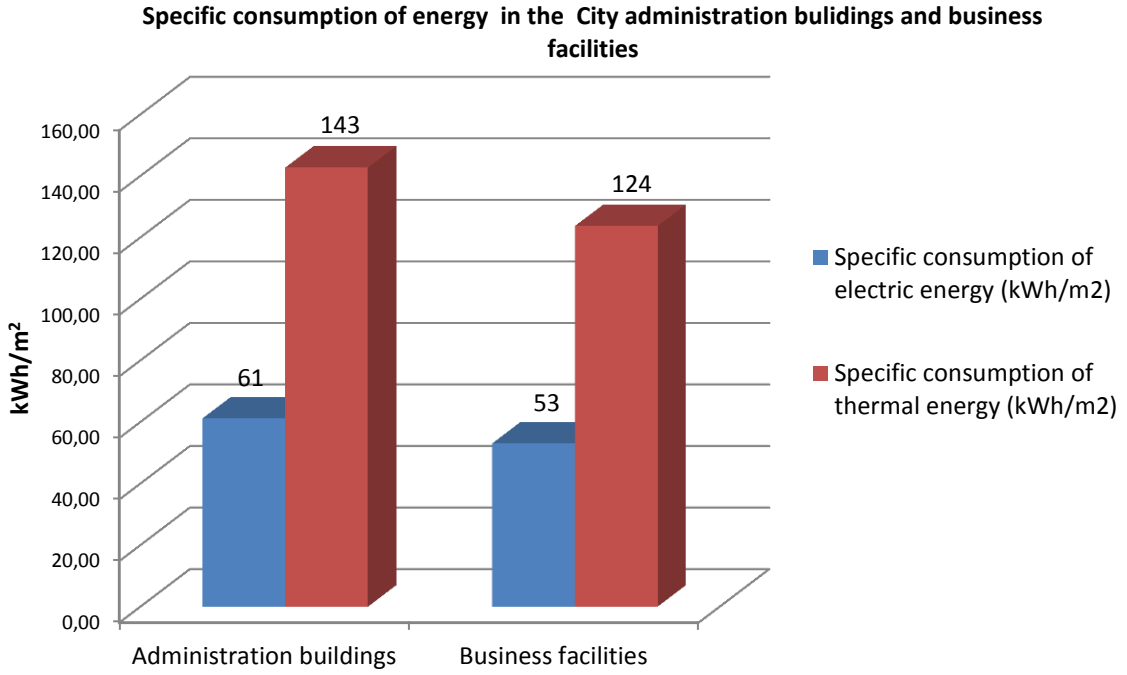

Figure 3.3 Comparison of specific consumption of electrical and thermal energy in this category

Based on conducted energy analysis of this building category, it can be concluded that the electricity as well as heat consumption are expected and typical for this kind of buildings in Albania. By comparison of specific consumption of electrical and thermal energy, it is obvious that administrative institutions spend more energy so it is important to detect the reasons for increased energy consumption.

3.1.4 Other public buildings

The following 4 community houses belong to this category of cultural institutions, with total area of 1 460 m^2:

- Te qendrojme se bashku, total area 280 m^2;
- Qend.per moshen e trete, total area 410 m^2 ;
- Qend.Multifunksionale TEN, total area 380 m^2 ;
- Qend.sociale te Zeri Popullit, total area 390 m^2.

The total of 8 244 kWh of electricity was spent in 2011 in this category, which gives a specific electricity consumption of 5,65 kWh/m^2. Table 3.4 shows parameters for thermal energy consumption per energy type.

Table 3.4 Parameters for thermal energy consumption per energy type

Energy source	Total heated floor area (m^2)	Thermal energy consumption (kWh)	Specific consumption (kWh/m^2)
Diesel	1 218	97 440	80,01
Electrical energy	242	19 237	79,44
Total	1 460	116 677	79,92

Consumptions of electrical and thermal energy of this building category are within the expected limits. Despite this, there is energy savings potential, especially for thermal energy which cannot be ignored.

3.1.5 Analysis of electricity and thermal energy consumption in the subsector Buildings owned by the City of Tirana

Analysis of electricity and thermal energy consumed in 2011 covered the categories described in the previous chapters within the buildings subsector owned by the City of Tirana:

- Educational institutions;
- Cultural institutions;
- City administration buildings and business facilities;
- other public buildings.

There are 181 buildings in the subsector of buildings owned by the City of Tirana, with total area of 257 421 m^2. This subsector spent 5 925 460 kWh of electricity in 2011, which equals to specific electricity consumption of 23,02 kWh/m^2.

Table 3.5 shows parameters for thermal energy consumption per energy type.

Table 3.5 Parameters for thermal energy consumption per energy type in subsector of buildings owned by the City of Tirana

Energy source	Total heated floor area (m^2)	Thermal energy consumption (kWh)	Specific consumption (kWh/m^2)
Electrical energy	179 621	9 650 610	53,73
Diesel	77 800	4 771 656	61,33
TOTAL	**257 421**	**14 422 266**	**56,03**

Structures of electricity and thermal consumption per category in subsector of buildings owned by the City of Tirana are presented in figures 3.4 and 3.5.

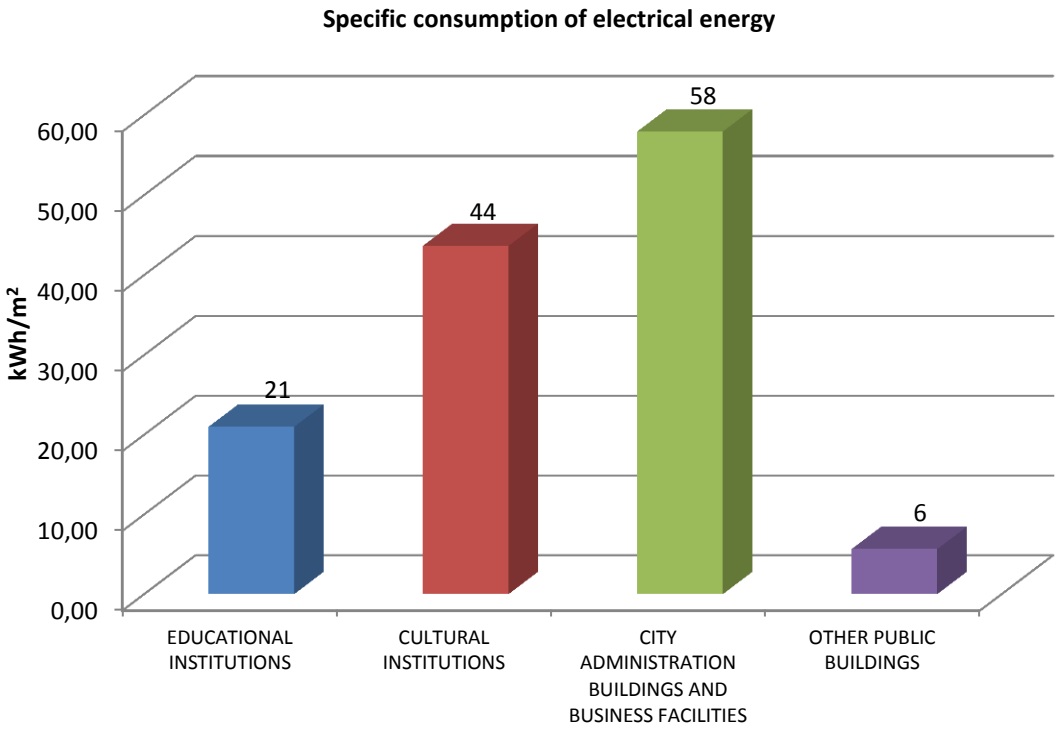

Figure 3.4 Comparison of specific electricity consumption per categories

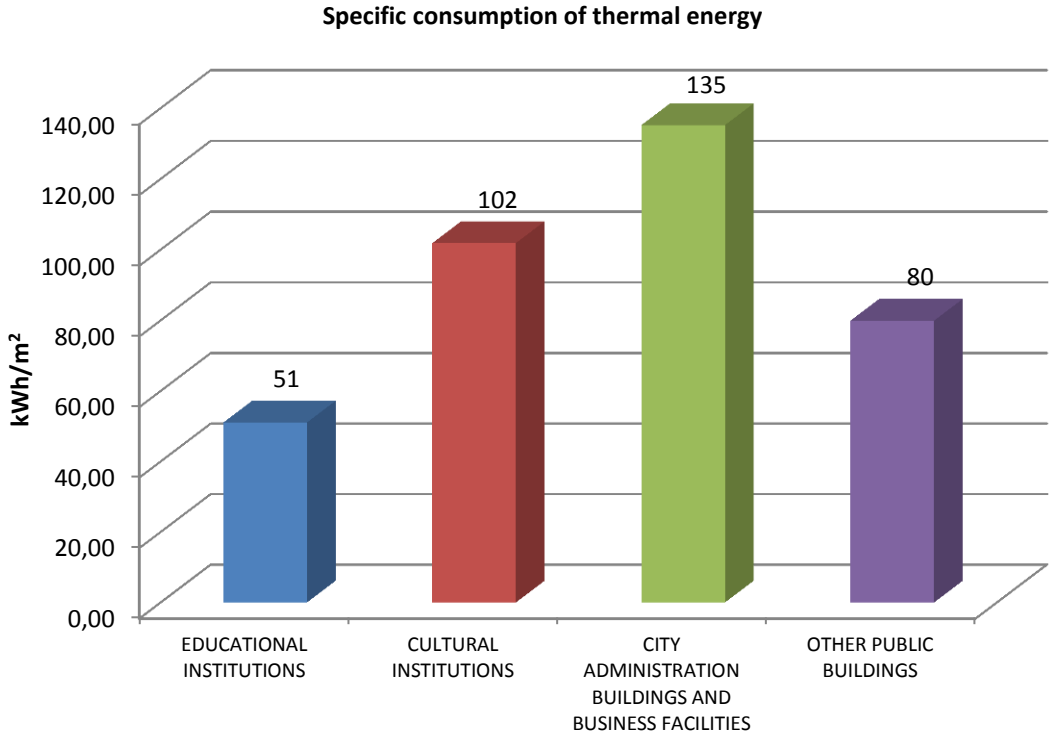

Figure 3.5 Comparison of specific thermal consumption per categories

From the comparison of specific heat and electricity consumptions, it is evident that most of the categories within subsector of buildings owned by the City have significantly higher consumption of thermal energy, and a recommendation is to conduct energy audits as soon as possible to detect and promptly remove the causes of high consumption.

The share of individual energy sources for heating in the buildings owned by the City is shown in the figure 3.6.

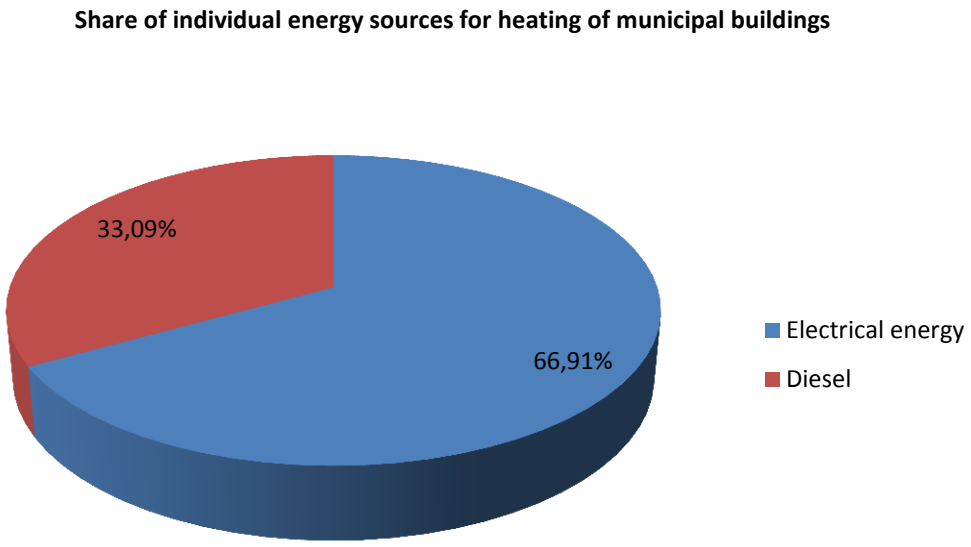

Figure 3.6 Share of individual energy sources for heating in the buildings owned by the City

The most significant energy type in the subsector of buildings owned by the City of Tirana is electricity with the highest share in consumption (67%), followed by diesel fuel (33%). Electricity as energy type is used in most buildings owned by the City of Tirana for heating/cooling and other purposes.

The conducted energy analysis of the subsector of buildings owned by the City of Tirana in 2011 shows that all categories have high potential for energy savings, both electricity and thermal energy.

3.2 Analysis of energy consumption in the residential sector in the City of Tirana in 2011

Total area of buildings in the residential sector in the City of Tirana in 2011 was 8 938 542 m^2, out of which 3 882 931 m^2 was heated area. According to the database for the collection of utility charges, there were 123 680 households in the City of Tirana in year 2011.

Data obtained from the distribution system operator CEZ Albania show that in year 2011 the residential sector in Tirana spent 304 644 614 kWh of electricity, which gives a specific electricity consumption of 78,46 kWh/m^2.

According to the data from City administration, most of the households use electricity for heating purposes. Consumption of other energy sources is estimated based on data on the structure of energy sources for heating from the Albanian Institute of Statistics (INSTAT). In this sense, some households are heated by liquefied petroleum gas (LPG), whereas the lower part has its own burning stove on fuel wood and diesel.

Table 3.6 Thermal energy consumption parameters in the residential sector of the City of Tirana

Energy source	Total heated floor area (m^2)	Thermal energy consumption (kWh)	Specific consumption (kWh/m^2)
Electrical energy	2 135 612	565 768 569	264,92
LPG	1 087 221	187 917 600	172,84
Fuel wood	465 951	37 555 200	80,60
Diesel	194 146	36 355 982	187,26
TOTAL	3 882 930	827 597 351	213,14

Total thermal energy consumption in the households subsector of the City of Tirana is 827 597 351 kWh, which equals to specific thermal energy consumption of 213,14 kWh/m^2.

It should be emphasized increasing trend of using solar collector systems for domestic hot water preparation in households. Typical solar collector surface needed to meet the demand for hot water preparation for a family of four is about 3 m^2. For the City of Tirana average solar irradiance is about 1,5 MWh/m^2, according to data taken from the Photovoltaic Geographical Information System (PVGIS). Taking into consideration the existing potential for exploitation of energy from solar radiation, and the current state of approximately 3 000 m^2 total area of solar collectors installed in the City of Tirana, steady increase of public interest for the use of renewable energy sources can be expected.

Figure 3.7 shows share of individual energy types for heating in households.

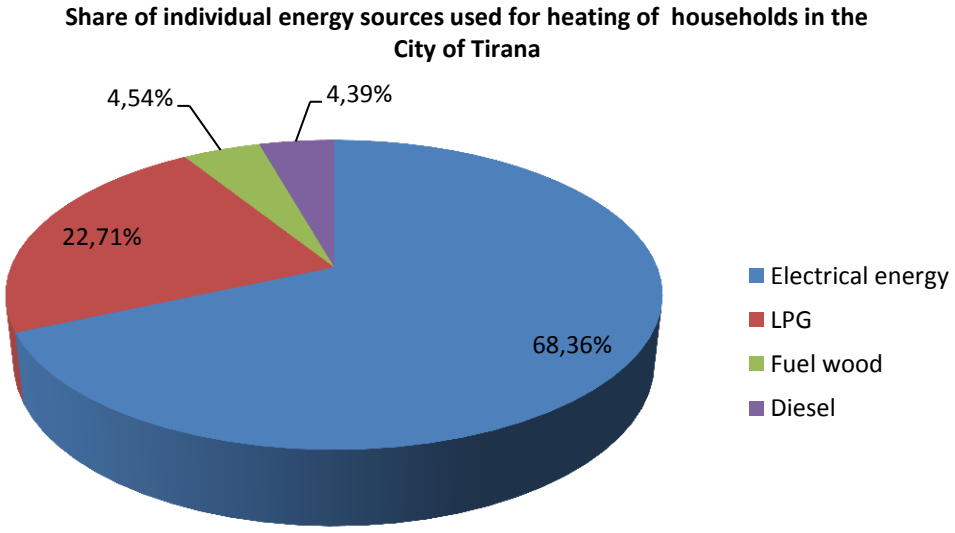

Figure 3.7 Share of individual energy types for heating in households in the City of Tirana

Analysis of energy consumption in the housing sector of Tirana shows great potential for energy savings, particularly thermal energy. Bearing in mind that according to the *Law on conservation of thermal energy in buildings*, specific heat consumption for new residential buildings is limited to 90-110 kWh/m^2, it is clear that existing households in the City of Tirana use energy irrationally. For that reason, numerous number of energy efficiency measures should be taken continually in order to rationalize energy consumption and associated CO_2 emissions reduction.

3.3 Analysis of energy consumption in the subsector of commercial and service buildings in the City of Tirana in 2011

Subsector of commercial and service buildings includes the following categories of facilities covering a total area of 2 732 310 m^2:

- Commercial and Administrative;
- Health, education, socio-cultural buildings;
- NGO's.

Data on the area of this subsector were obtained from the Tax Office of the Municipality according to the tax invoices for the use of business space. Data on the total consumption of electricity of subsector of commercial and service buildings were obtained from the distribution system operator CEZ Albania. So, a total of 177 629 000 kWh of electricity was spent in year 2011, which gives specific consumption of 65,01 kWh/m^2.

Structure of energy sources for heating was modeled according to the National Energy Strategy and based on assumed, experientially determined specific consumption of thermal energy of the buildings of similar purposes, as well as on the experiences of the energy experts.

The parameters of thermal energy consumption in subsector of commercial and service buildings in the City of Tirana are given in table 3.7.

Table 3.7 The parameters of thermal energy consumption in subsector of commercial and service buildings

Energy source	Total heated floor area (m^2)	Thermal energy consumption (kWh)	Specific consumption (kWh/m^2)
Electrical energy	2 443 217	329 751 000	134,97
LPG	63 725	12 261 560	192,41
Fuel wood	19 919	2 342 016	117,58
Fuel oil	205 449	33 662 188	163,85
TOTAL	2 732 310	378 016 764	138,35

Modeled in the described manner, the total thermal consumption in the subsector of commercial and service buildings in the City of Tirana is 378 016 764 kWh. Figure 3.8 shows the share of individual energy sources for heating in the subsector of commercial and service buildings.

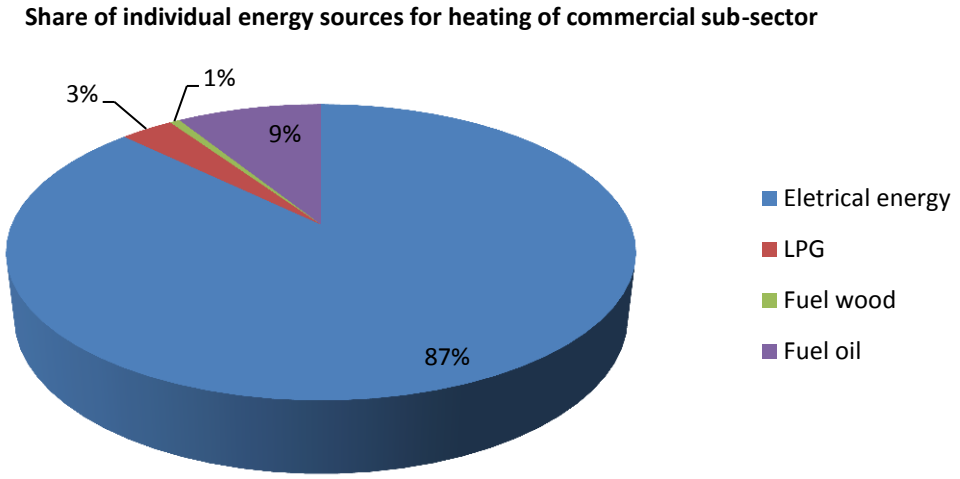

Figure 3.8 Share of individual energy sources for heating in the subsector of commercial and service buildings in Tirana

Analysis of the energy consumption in the subsector of commercial and service buildings of the City of Tirana shows energy saving potential for electricity and thermal energy. used as the sole energy type, as well as possibility of replacement of the energy type for heating. To that regard, it is necessary to take numerous energy efficiency measures in order to rationalize consumption and to reach the final target – CO_2 emission reduction by over 20% by year 2020.

3.4 Conclusion

According to the results of the energy analysis conducted in the buildings sector of the City of Tirana, most energy is consumed in the residential subsector, followed by the subsector of commercial and service buildings and finally in the buildings owned by the City (table 3.8 and figure 3.9).

Table 3.8 The structure of energy consumption in building sector per subsectors

SUBSECTOR	Number of buildings	Total heated floor area (m^2)	Thermal energy consumption (kWh)	Electrical energy consumption (kWh)
MUNICIPAL BUILDINGS				
EDUCATIONAL INSTITUTIONS	152	240 961	12 301 440	5 058 295
CULTURAL INSTITUTIONS	4	710	72 303	30 987
CITY ADMINISTRATION BUILDINGS AND BUSINESS FACILITIES	21	14 290	1 931 846	827 934
SOCIAL BUILDINGS	4	1 460	116 677	8 244
TOTAL	**181**	**257 421**	**14 422 265**	**5 925 460**
RESIDENTIAL BUILDINGS				
TOTAL	**123 680**	**3 882 930**	**827 597 351**	**304 644 614**
COMMERCIAL AND SERVICE BUILDINGS				
TOTAL	**23 143**	**2 732 310**	**378 016 764**	**177 629 000**
TOTAL	**147 004**	**6 872 661**	**1 220 036 380**	**488 199 074**

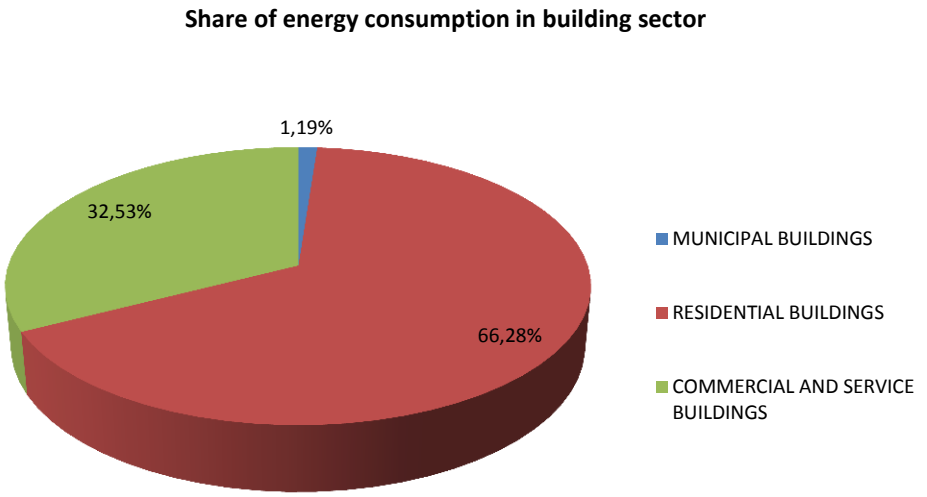

Figure 3.9 The structure of energy consumption in building sector per subsectors

Shares of each subsector in the total consumption of electricity and thermal energy of the buildings sector are shown in figures 3.10 and 3.11.

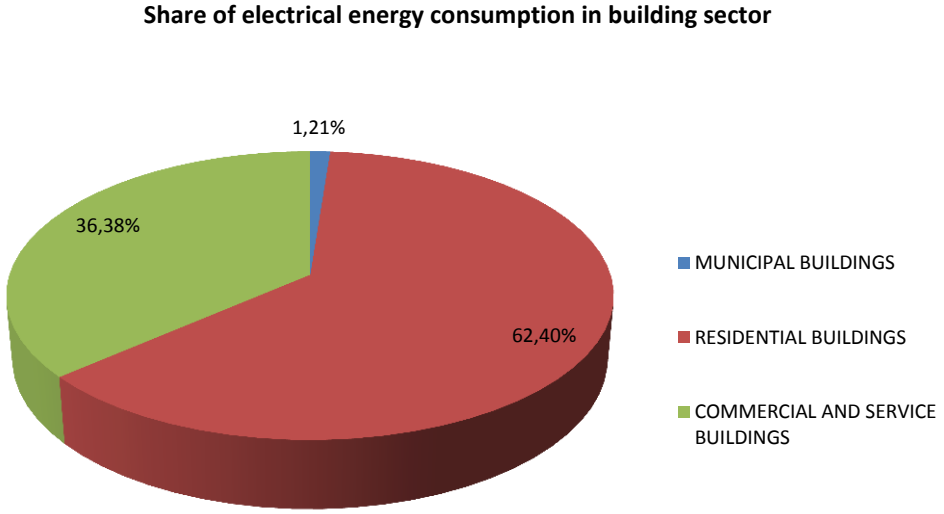

Figure 3.10 The structure of electricity consumption in building sector per subsectors

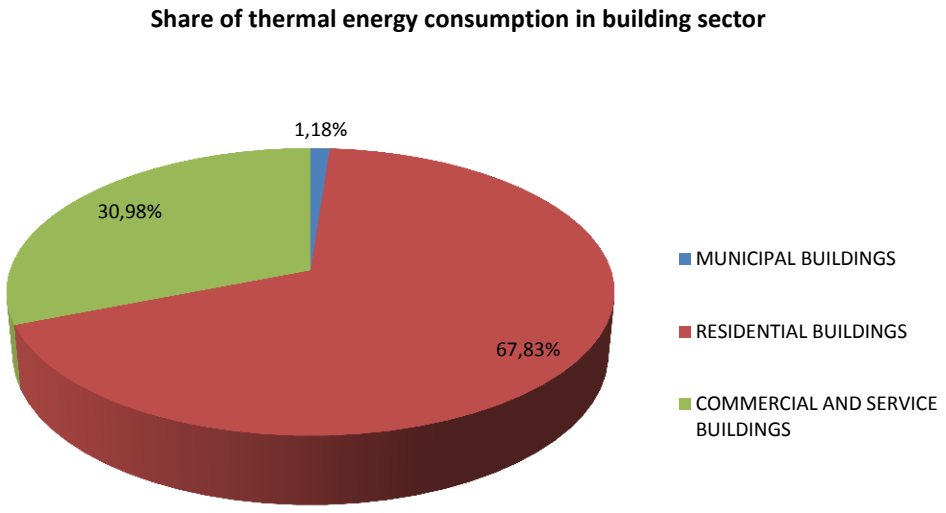

Figure 3.11 The structure of thermal energy consumption in building sector per subsectors

The principal conclusion of the energy analysis conducted in the buildings sector of the City of Tirana is that implementation of various energy efficiency measures can result in significant energy and ecology savings. Specifically, for the subsector of buildings owned by the City one of the most important prerequisite is performance of detailed energy audits.

A detailed overview of measures whose implementation would result in significant reduction in electricity and thermal energy consumption per subsectors of the buildings sector in the City of Tirana is presented in Chapters 7 and 8.

4 Analysis of Energy Consumption of the Transport Sector in the City of Tirana in 2011

For the purpose of energy consumption analysis, the transport sector of the City of Tirana is divided into the following subsectors:

- Municipal fleet;
- Public transport;
- Private and commercial vehicles.

Relevant data for analysis of fuel consumption in the transport sector were collected from the following sources:

- The City of Tirana administration;
- Directorate General of Road Transport Services;
- Tirana public transport associations;
- Transportation companies;
- Directory of City Transport;
- Sustainable Transport Strategy 2008;
- Association of Taxi Drivers.

Based on the collected data, the following parameters were determined for all subsectors of transport sector of the City of Tirana:

- General subsector data;
- Fleet structure according to vehicle use;
- Classification of vehicles according to the type of fuel used;
- Consumption of various types of fuel per subsector and categories of vehicles within the sector.

4.1 Fleet owned by the City of Tirana - municipal fleet

Fleet owned by the City of Tirana includes municipal vehicles and vehicles used by specific public enterprises. Fleet owned by the City of Tirana includes personal and commercial vehicles. The total number of personal vehicles is 58 and commercial is 42. Commercial vehicles are primarily used for commercial purposes and comprise the subcategories combined vehicles, freight and utility vehicles. Commercial vehicles are used for carrying out various work activities.

From total number of municipal fleet, 80 of them use diesel and the rest use gasoline. Table 4.1 shows the various fuel types used for the vehicles owned and operated by the City of Tirana, as well as fuel consumption by fuel type.

Table 4.1 Structure of fuel consumption of the City of Tirana fleet

Municipal fleet	No. of vehicles	Consumption	
		l	kWh
Diesel	80	323 760	3 224 650
Gasoline	20	74 520	696 613
Total	**100**	**-**	**3 921 263**

The structure of municipal fleet per type of vehicles is shown in figure 4.1 and the structure of fuel consumption by fuel type is presented in figure 4.2.

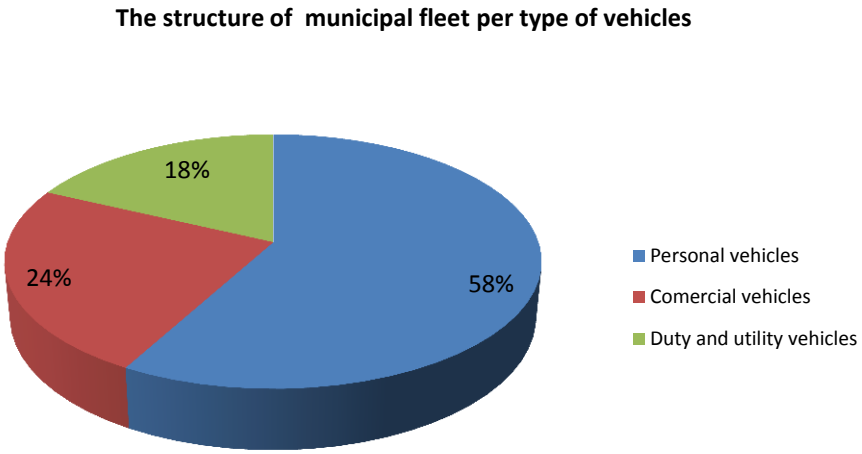

Figure 4.1 The structure of municipal fleet per type of vehicles

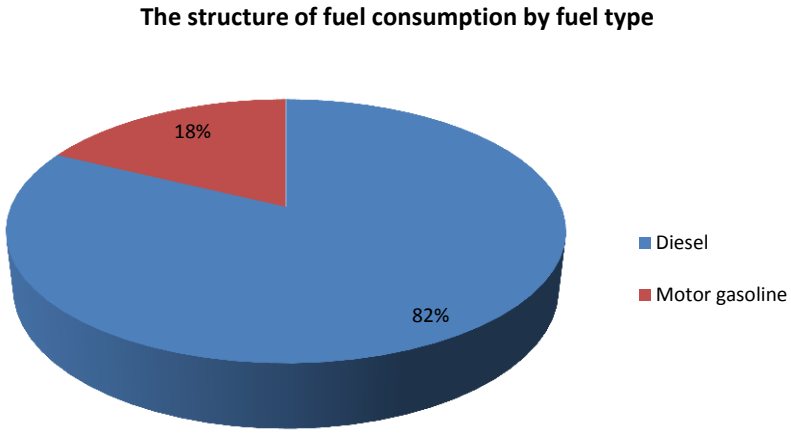

Figure 4.2 The structure of fuel consumption by fuel type

4.2 Public transport in the City of Tirana

Public transport in the City of Tirana includes bus transport and taxi services.

4.2.1 Public bus transport

There are 10 urban bus lines in operation in the City of Tirana (two others are licensed but out of operation in 2011). All buses, use diesel as fuel, and most of them were produced by IVECO. Regarding age of the buses, some of them are pretty old, produced before year 1990 and the rest of them are produced in year 2009. The old ones belong to the City (actually the company operating the Lines belongs to the City). They operate according two schedules: Summer schedule (May - Nov) 05:00 - 24.00 and Winter schedule (Dec - Apr) 05:30 - 23:00. In the periods from 05:00 - 06:00 and from 21:00 - 24:00, the number of the operating buses is decreased by 50%. This timetable is also accurate during weekends and holidays.

The total length of all the lines is about 70 km. The frequency of the buses is different for every line and also depending on the hours (rush hours and normal operation), starting from every 5.5 minutes to 30 minutes.

The largest flow of passengers is between 06:00 and 09:00 in the morning on the bus line Kombinat – Kinostudio. The data on public bus transport is presented in table 4.2.

Table 4.2 Characteristics of the public bus transportation on the territory of the City of Tirana

Public bus transportation on the territory of the City of Tirana				
No. of diesel vehicles (working days)	No. of passenger seats (working days)	Consumption of diesel fuel (t/year)	Km traveled per year	No. of transported passengers per year
166	1 355	4 411	7 906 267	54 873 000

The proposal is to conduct a pilot project to introduce buses on some of the environmental friendly energy sources, such as compressed natural gas, biodiesel or waste cooking oil that would be collected in the City, in order to verify, in real terms the advantages of using such vehicles.

4.2.2 Public taxi transport

Taxi services on the City territory are organized by 928 vehicles, of which 75% of them use diesel as fuel. Characteristics of the public taxi transport taxi in the City of Tirana are presented in table 4.3.

Table 4.3 Characteristics of the taxi services in the City of Tirana

PUBLIC TAXI TRANSPORT IN THE CITY OF TIRANA - 2011						
Total No. of vehicles (working days)	Diesel		Gasoline		No. of transported passengers per year	Km traveled (per year)
	No. of vehicles	Consumption (l/year)	No. of vehicles	Consumption (l/year)		
928	696	1.656.000	232	662.500	5.427.500	21.112.000

4.2.3 Total energy consumption in public transport

Total fuel consumption by categories of public transport in year 2011 is shown in table 4.4, and the share of different energy sources in total energy consumption of public transport in the city in figure 4.3.

Table 4.4 Fuel consumption in public sector

Category	Total energy consumption, kWh		
	Diesel	Gasoline	Total
Bus transport	51 436 434	-	51 436 434
Taxi services	16 493 760	6 193 050	22 686 810
TOTAL	**67 930 194**	**6 193 050**	**74 123 244**

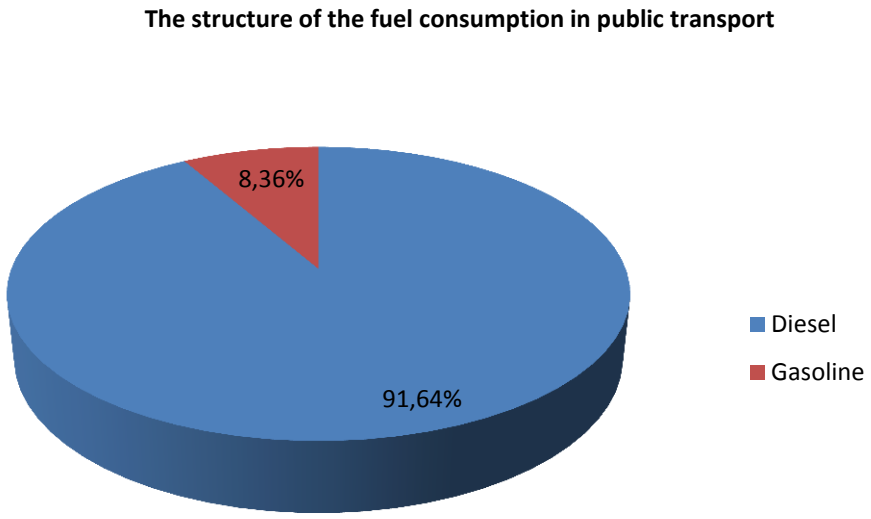

Figure 4.3 The structure of fuel consumption in public sector

4.3 Personal and commercial vehicles

4.3.1 General information

The number of registered motor vehicles in the City of Tirana in year 2011 is 141 592.
Movement of the total number of registered vehicles, according to the Tirana Municipal Sustainable Transport Strategy, is presented in figure 4.4.

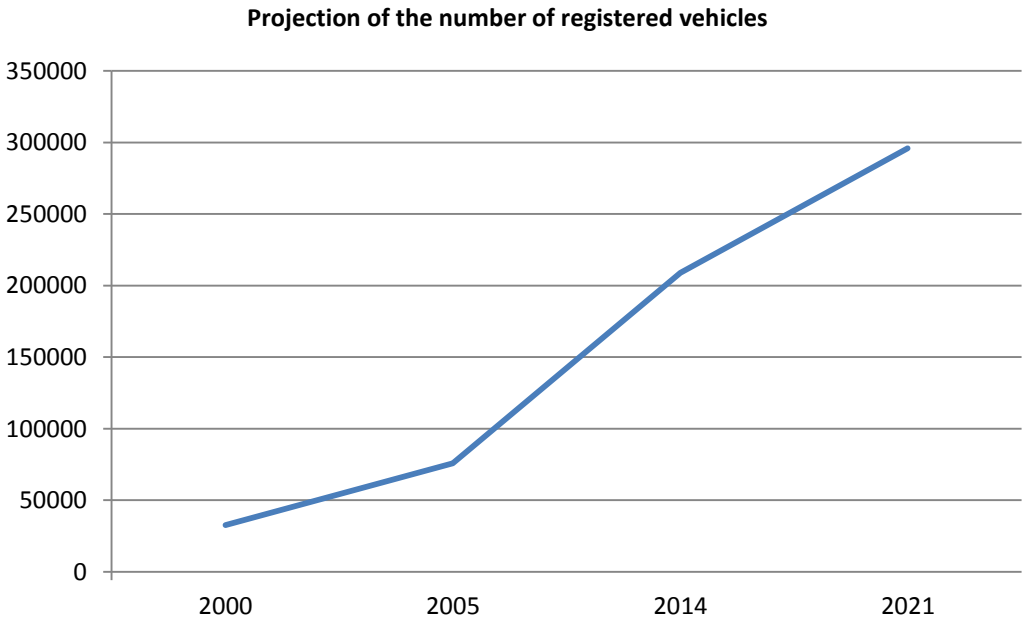

Figure 4.4 Projection of the registered vehicles from 2000 to 2021 years

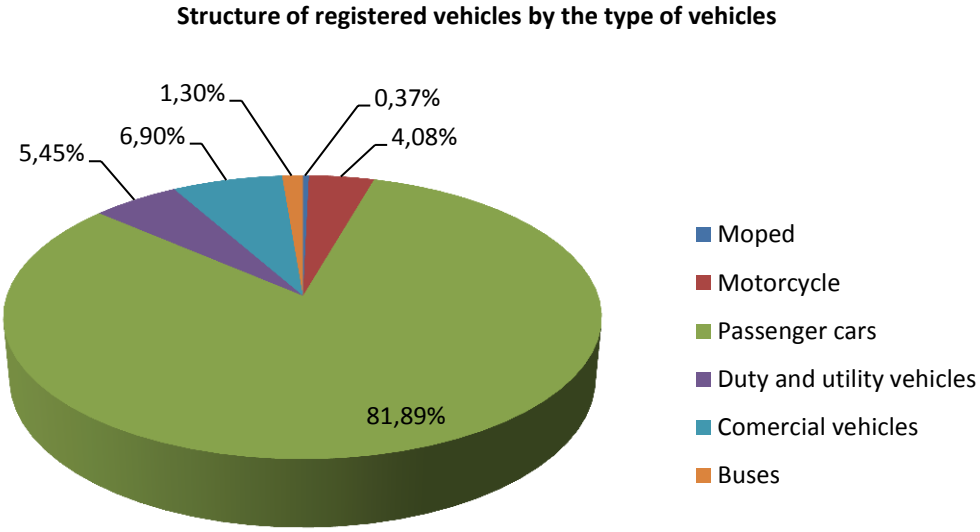

Figure 4.5 The structure of registered vehicles by vehicle type

In the total number of vehicles in the subsector of personal and commercial vehicles of the City of Tirana, the largest share belongs to personal cars that cover 81,89% of the total number of vehicles. Out of the rest of vehicles in the subsector, multi-purpose vehicles cover 6,90% and cargo and working vehicles cover 5,45%, while the remaining share goes to motorcycles, mopeds and buses. Most of the vehicles (82%) is owned by physical persons.

4.3.2 Fuel consumption of personal and commercial vehicles

Data on the structure and the total fuel consumption of personal and commercial vehicles were not available. That is the reason why fuel consumption of the stated categories of vehicles was estimated using COPERT IV model, developed by the European Environment Agency.

The subsector of personal and commercial vehicles of the City of Tirana is consisted of the following categories of vehicles: personal cars, duty and utility vehicles, buses, mopeds and motorcycles. The obtained statistic data on the number and types of registered vehicles in the City of Tirana were adjusted and harmonized with classification of COPERT IV calculation programme.

Evaluation of fuel consumption of personal and commercial vehicles in the City of Tirana is given in table 4.5 and figure 4.6.

Table 4.5 Fuel consumption in year 2011

Type of vehicles	Motor gasoline (t)	Diesel (t)	LPG (t)	Fuel consumption, kWh
Personal vehicles	27 634,80	13 180,40	567,80	504 408 373
Duty and utility vehicles	392,70	5 583,50	-	69 986 390
Moped and motorcycle	654,60	-	-	8 137 387
Buses	-	1 538,90	-	17 943 528
TOTAL	**28 682,20**	**20 302,80**	**567,80**	**600 475 678**

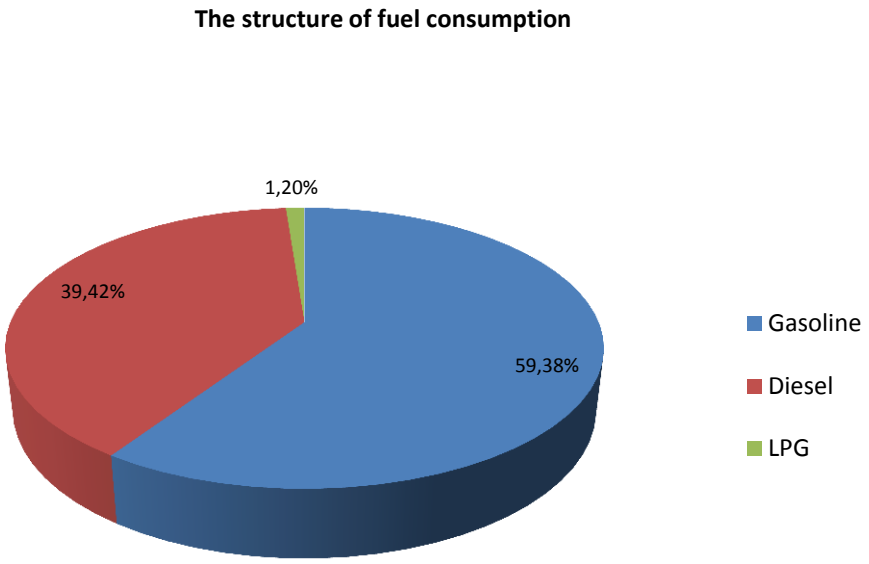

Figure 4.6 Share of fuel consumption per fuel type

In the subsector of personal and commercial vehicles, gasoline has the highest share in the total fuel consumption of this subsector amounting to 59,38%. Share of diesel fuel consumption is 39,4%, and share of UNP amounts to 1,2% of the total consumption of sub-sector.

The structure of fuel consumption per categories of vehicles and types of fuel are given in figure 4.7 and 4.8.

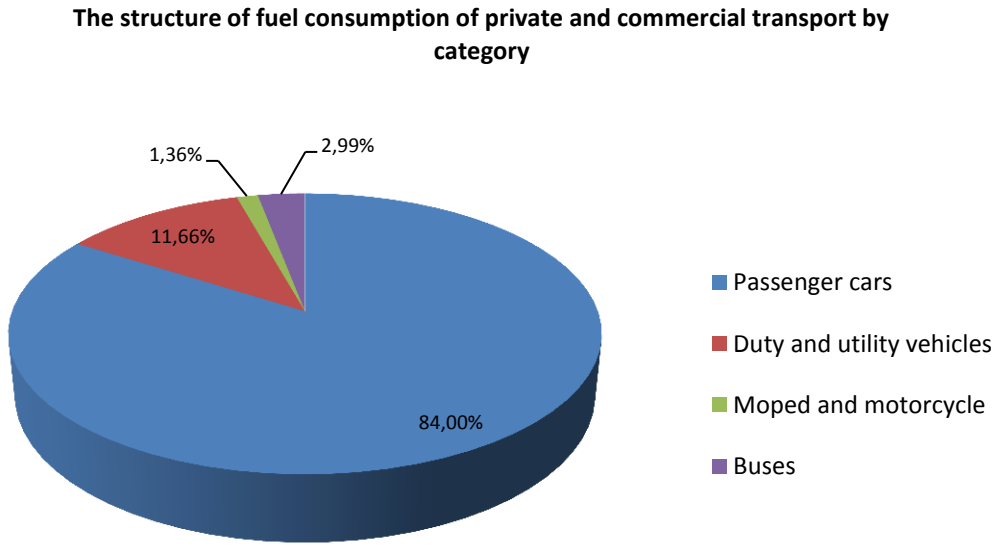

Figure 4.7 The structure of fuel consumption per categories of vehicles

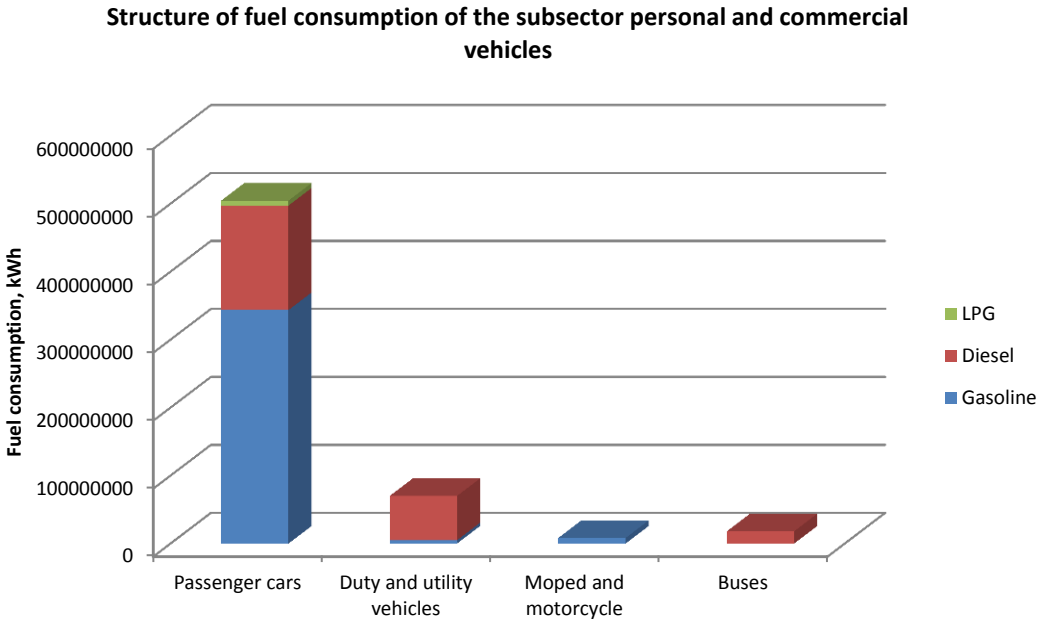

Figure 4.8 Fuel consumption per categories of vehicles and types of fuel

Out of the total fuel consumption of the subsector of personal and commercial vehicles, 84% goes to personal cars, 11,66% goes to duty and utility vehicles while the rest goes to motorcycles and mopeds, as well as buses owned by physical and legal persons (figure 4.8).

4.4 Conclusions

The analysis of fuel consumption of the transport sector of the City of Tirana for year 2011 shows that the highest share of fuel consumption goes to the subsector of personal and commercial vehicles (figure 4.9).

Accordingly, proposed measures for reduction of emission of greenhouse gases for the transport sector are mainly based on efforts to change the presented shares in favour of the public transport and on education and promotion of environmental friendly ways of transport.

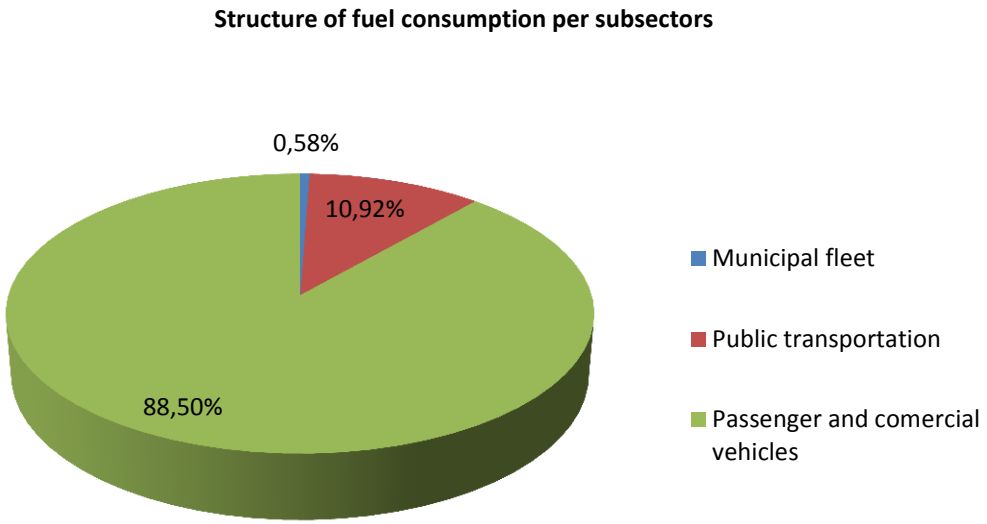

Figure 4.9 Structure of fuel consumption per subsectors in the transport sector of the City of Tirana

The structure of fuel consumption of the transport sector per types of fuel is presented in figure 4.10.

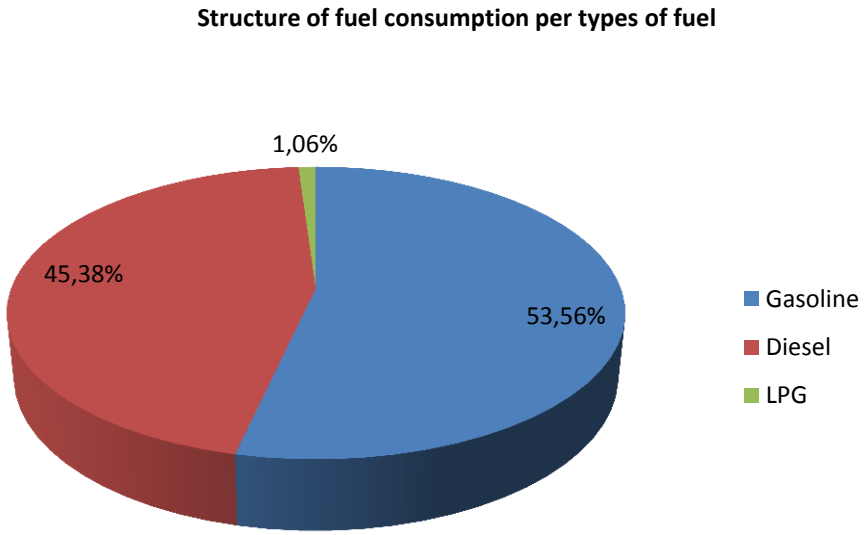

Figure 4.10 The structure of fuel consumption of the transport sector per types of fuel

Gasoline is the most important fuel in the transport sector and its share amounts to 53,93% out of the total consumption. The share of diesel fuel amounts to 44,98%, while the rest of 1,09% goes to UNP (figure 4.10).

The fuel consumption of the transport sector per types of fuel and the subsectors is given in figure 4.11.

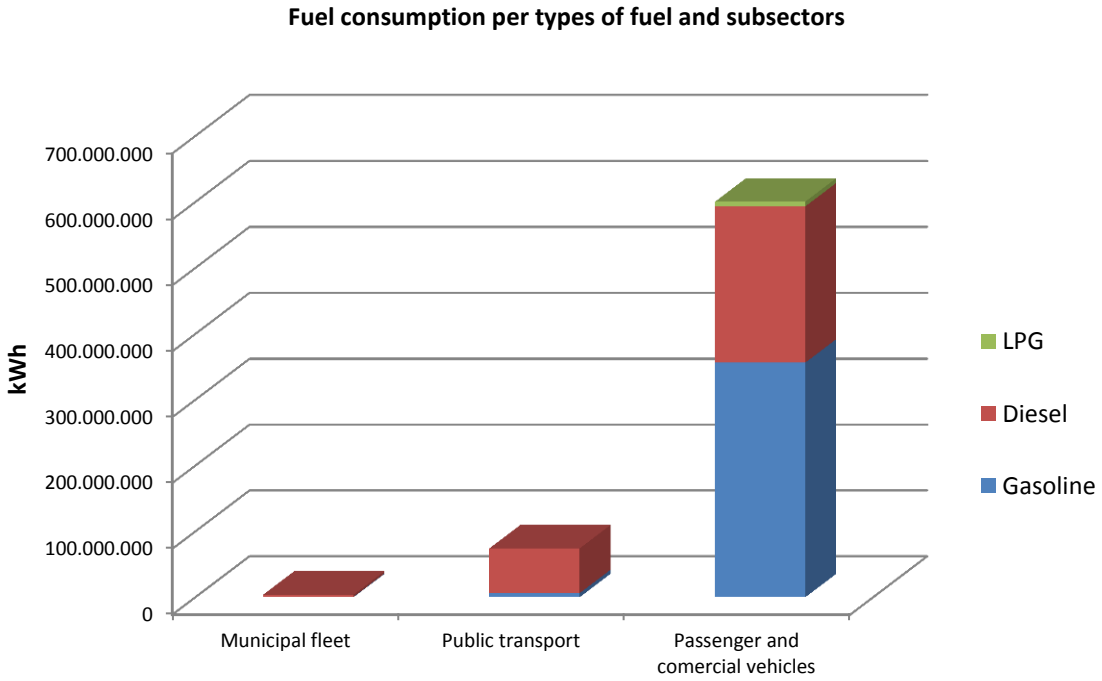

Figure 4.11 Fuel consumption of the transport sector per types of fuel and subsectors

Total energy consumption in the transport sector of the City of Tirana in year 2011 was 678 520,19 MWh, out of which 88,50% belong to the personal and commercial vehicles subsector, 10,92% to the public transport subsector, and 0,58 % to vehicles owned by the City of Tirana.

It is evident from the analysis that the subsector of personal and commercial vehicles is by far the most important, both in terms of energy consumption and in terms of potential energy savings. Therefore, most of the proposed measures will be aimed at the subsector of personal and commercial vehicles without which it will not be possible to achieve significant savings in the transport sector.

5 Analysis of energy consumption of the public lighting sector in the City of Tirana in 2011

5.1 Introduction

The entire public lighting network is owned by the City of Tirana itself, which simplified and accelerated the process of collecting the required data, and which will certainly facilitate implementation of the identified energy efficiency measures.

Relevant data for the analysis of electricity consumption in the public lighting sector of the City of Tirana were collected by:

- General Directorate of Services;
- City of Tirana.

Based on the collected data, the following parameters and features will be given for the public lighting sector in Tirana:

- General data on the public lighting sector;
- Structure of electrical network of the public lighting;
- Types of electrical lighting sources (electric bulbs);
- Categories of electrical lighting facilities (lamps);
- Total consumption of electricity of the sector (kWh).

5.2 General data on the public lighting sector of the City of Tirana

Public lighting is a part of the community infrastructure of the City of Tirana which construction and maintenance are under the jurisdiction of the City enterprise with 44 employees. Maintenance of the public lighting includes management, maintenance of buildings and equipment of public lighting.
It should be emphasized that the number of metering points supplying the public lighting facilities is constantly increasing, and this number was 180 at the end of 2011.

Technical documentation for public lighting in the City of Tirana currently exists only in paper form, i.e. there is no lighting register within the geographic information system (GIS). Geographic Information System (abbr. GIS) is a very important tool in the process of adequate and efficient management, because it allows displaying of every facility of interest, and in the case of public lighting those are: lighting fittings, power lines and measuring points, in the form of corresponding symbols in their actual position in space. GIS integrates spatial information with other types of information within a system and in that way it offers a consistent framework for spatial analysis. Namely, apart from geo-information, every facility in the space is associated with a provisional (but defined in advance) set of additional information (attributes) describing the facility in full and forming a basis for various analyses during the use of the system. Public lighting GIS provides faster access to data (stand-by service, development, maintenance), easier orientation, efficient management (all lighting point and power line parameters are available in advance), rational resources management, easier data sharing with other municipal services and efficient analysis of the current status and needs (monitoring interventions, costs, changes etc.).

5.3 The electrical network of public lighting in the City of Tirana

5.3.1 Structure of electrical network of the public lighting in the City of Tirana

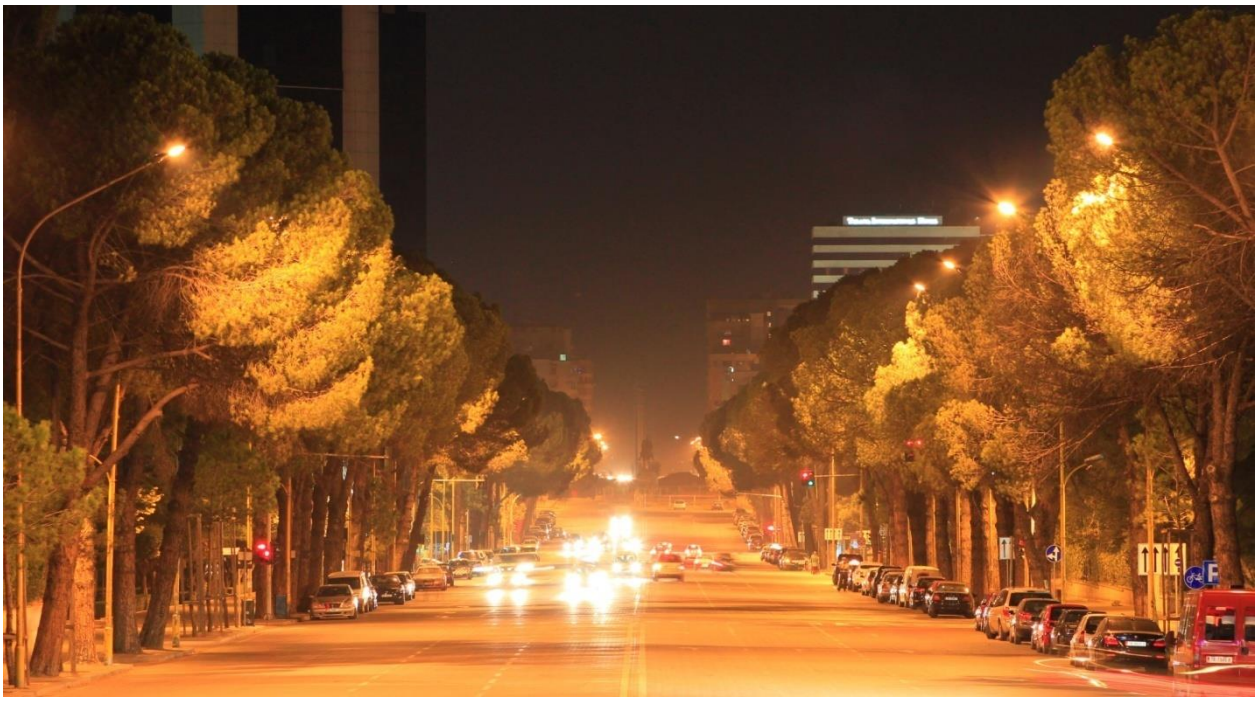

Figure 5.1 The photo of public lighting in Tirana

Public lighting network of City of Tirana includes power devices, cables (underground or overhead), poles, lamp posts, lamps, lighting sources (bulbs) and management and regulation devices. The public lighting network is powered by distribution network CEZ Albania.

Management of public lighting system was based on the principle of light (photocell) through Lux device. This operational mode is used for automatically turn on and off of electrical lighting and works on the principle of photo-electric effect. Turn on and off of electric lighting take place on the certain level of brightness with preliminary defined level of activation and time delay. Given that outdoor lighting is directly related to natural conditions and daylight, it is logical that the primary regulation is corresponded to this parameter particularly. This operational mode is typical for systems with a large number of transformer stations.

The electrical public lighting network in the City of Tirana includes 13 993 lamps, supplied from 180 transformer stations. Public lighting in Tirana operates for 4 520 hours on average.
According to the type of the light source in the City were installed:

- 17 classical lamps;
- 23 fluorescent lamps;
- 259 mercury lamps;
- 893 sodium lamps;
- 614 halogen lamps;
- 9 719 metal halide lamps;
- 1 928 compact fluorescent;
- 540 others (LED).

The structure of the electrical network of public lighting according to the type of the light source is presented in the figure 5.2.

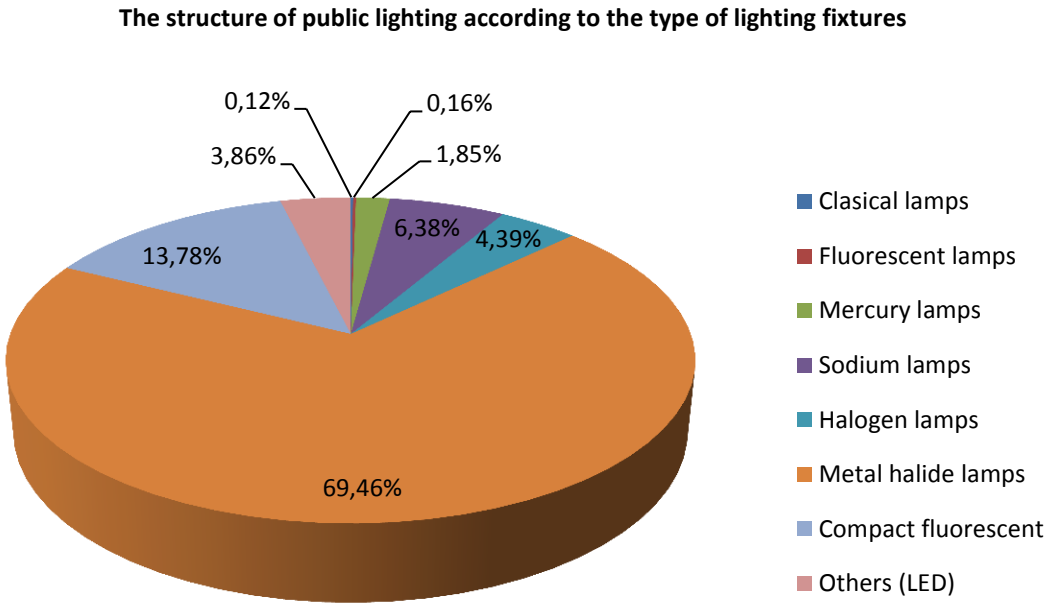

Figure 5.2 The structure of the public lighting network according to the type of the light source

The structure of the public lighting in the City of Tirana consists of various types of lighting fixtures. It should be noted that about 2% of the total installed lighting fixtures are environmentally unfriendly mercury bulbs. About 70% of the installed lighting fixtures are metal halide lamps. The most part of public lighting fixtures are the lambs of the new generation under the age of 15 years, while the environmentally friendly lamps of the latest generation are pretty rare. With the emergence of the need for good illumination of the traffic areas, taking into account the need to protect from light pollution, as well as the importance of environmental protection and reduced energy consumption, the gradual replacement of the existing, primarily mercury lamp, road and park lighting fixtures with modern, energy-efficient and environmentally acceptable lighting fixtures with better lighting and technical characteristics, is recommended.

In this regard, the City of Tirana developed the Study of modernization of the public lighting system which proposes an extension of existing lighting network to 20 000 light source with simultaneous replacement of existing inefficient lighting fixtures and an establishment of the central management system, which will achieve energy savings of 45% compared to the current state. This reduction of electricity consumption will saved considerable amount of the means from the City budget.

5.3.2 The electricity consumption of the public lighting sector

The installed capacity of the existing system of public lighting is 2 214.31 kW, while electricity consumption in year 2011 was 6 895 024 kWh. An overview of electricity consumption of public lighting system in the period from 2010 to 2012 was given in figure 5.3, with the obvious trend of increase of electricity consumption due to widening of the public lighting network.

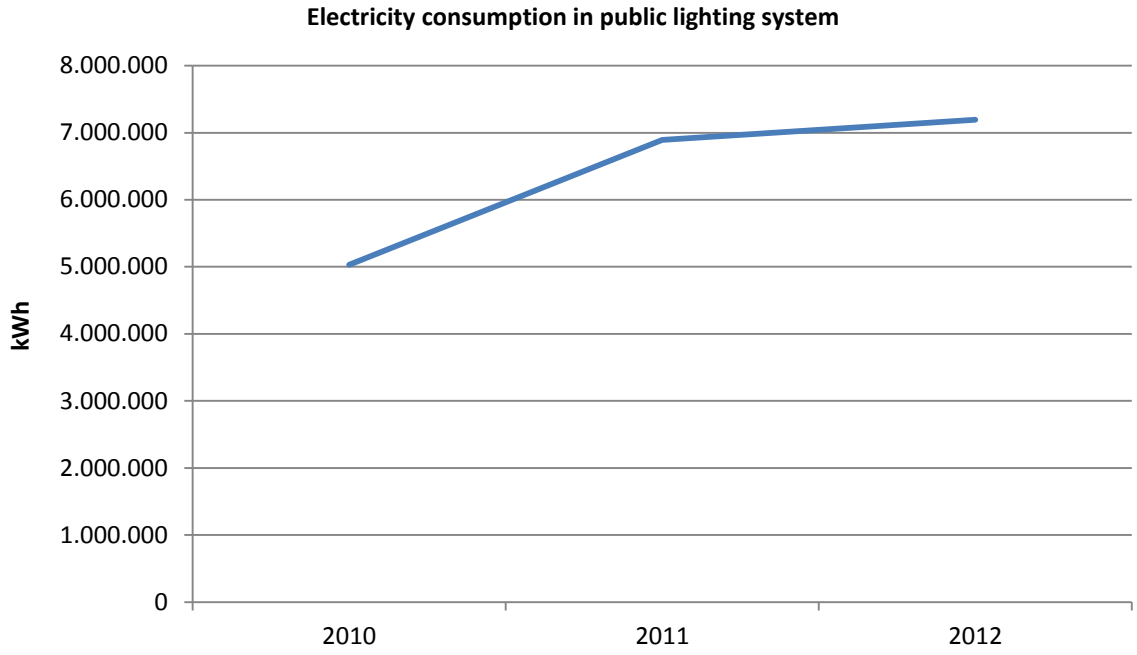

Figure 5.3 Electricity consumption in public lighting system for the three-year period from year 2010 to 2012

5.4 Conclusion

In addition to its basic function, the public lighting has to fulfill a series of other requirements, such as: esthetical incorporation into a visual identity of space, creation of friendly ambient, economy requirements, reliability, reduced maintenance costs, possibility of remote control, etc.

It is necessary to replace all, technologically out of date, lamps with lamps of the new generation which have an installed device for reduction of installed capacity or electronic switching device with possible regulation. This enables electricity savings up to 60%, better lighting effects, longer life of lamps and minimized maintenance costs.

Orientation towards modern planning and maintenance of the public lighting network in City of Tirana demands elaboration of geodetic data which as basis for preparation of GIS data base. It is also necessary to prepare light-technical charts for the City of Tirana which will precisely regulate classes of lighting of traffic roads and technical features needed for designing of the public lighting.

Also, one of the proposed activities for the coming period is the testing of reduction of electricity consumption of LED lamps and solar lamps (pilot projects). It is estimated that installation of LED lamps can result in reduction of electricity consumption by 6 times.

As for the public lighting sector in the City of Tirana, it is necessary to undertake a series of sustainable energy measures by applying modern environmental solutions which result in considerable energy savings on one side, and reduction of light pollution on the other side.

Identified measures for reduction of CO_2 emission for the public lighting sector in the City of Tirana are given in the chapters 7 and 8.

6 The Baseline Emission Inventory of the City of Tirana (BEI)

The Baseline CO_2 Emission Inventory of the City of Tirana (hereinafter: BEI or Inventory) was elaborated for year 2011 which was selected as the baseline year. The main criterion in selection of the baseline year was the availability of data required for calculation of CO_2 emission. Unreliable energy consumption data and the necessary estimate of CO_2 emission would result in significant insecurity of the baseline emission inventory which is not in accordance with the principles of the methodology prescribed by the European Commission.

The Inventory included three sectors of final energy consumption in the City of Tirana: buildings, transport and public lighting, in accordance with the sector classification in the recommendations of the European Commission. The calculation covered direct (fuel burning) and indirect emission (electricity and thermal energy consumption).

BEI of the City of Tirana was done in accordance with the Protocol of the Intergovernmental Panel on Climate Change (IPCC) as the executive body of the UN Environment Programme - UNEP and the World Meteorological Organization – WMO in implementation of the United Nations Framework Convention on Climate Change – UNFCCC. By ratifying the Kyoto Protocol in 2004, Albania committed to monitoring and reporting on the pollutant emission to the atmosphere according to the IPCC Protocol, and it was also used as the nationally recognized protocol in elaboration of CO_2 baseline emission inventory for the City of Tirana. Since IPCC has not suggested the methodology for calculation, it was developed as the part of this Inventory.

6.1 Baseline CO_2 Emission Inventory in the buildings sector

CO_2 emission from the buildings sector of the City of Tirana includes emission from the electricity consumption as well as from fuel burning. Emission from fuel burning is calculated through standard emission factors (the first level of calculation according to IPCC methodology), and the average emission factors were used for calculation of the emission from the electricity consumption (table 6.1).

Table 6.1 Emission factors used for determining CO_2 emission in the buildings sector of the City of Tirana

ENERGY SOURCE	Emission factors, t CO_2/TJ
Fuel oil	77,22
Natural gas	0,00
Fuel wood	0,00
Motor gasoline	69,33
Diesel	73,89
LPG	63,10
Electrical energy	79,17

Table 6.2 CO_2 emission in the buildings sector of the City of Tirana

CATEGORY	Emission, t CO_2				
	Electricity consumption	Diesel consumption	Fuel oil consumption	LPG consumption	TOTAL
MUNICIPAL BUILDINGS					
EDUCATIONAL INSTITUTIONS	3 615,38	1 243,34	-	-	4 858,72
CULTURAL INSTITUTIONS	29,44	-	-	-	29,44
CITY ADMINISTRATION BUILDINGS AND BUSINESS FACILITIES	786,54	-	-	-	786,54
SOCIAL BUILDINGS	7,83	25,92	-	-	33,75
TOTAL	**4 439,18**	**1 269,26**	**-**	**-**	**5 708,44**
COMMERCIAL AND SERCVICE BUILDINGS					
TOTAL	**144 603,42**	**-**	**9 357,82**	**2 785,34**	**156 746,57**
RESIDENTAIL BUILDINGS					
TOTAL	**248 067,96**	**9 670,70**	**-**	**42 687,40**	**300 426,05**
BUILDINGS TOTAL	**397 110,55**	**10 939,96**	**9 357,82**	**45 472,73**	**462 881,07**

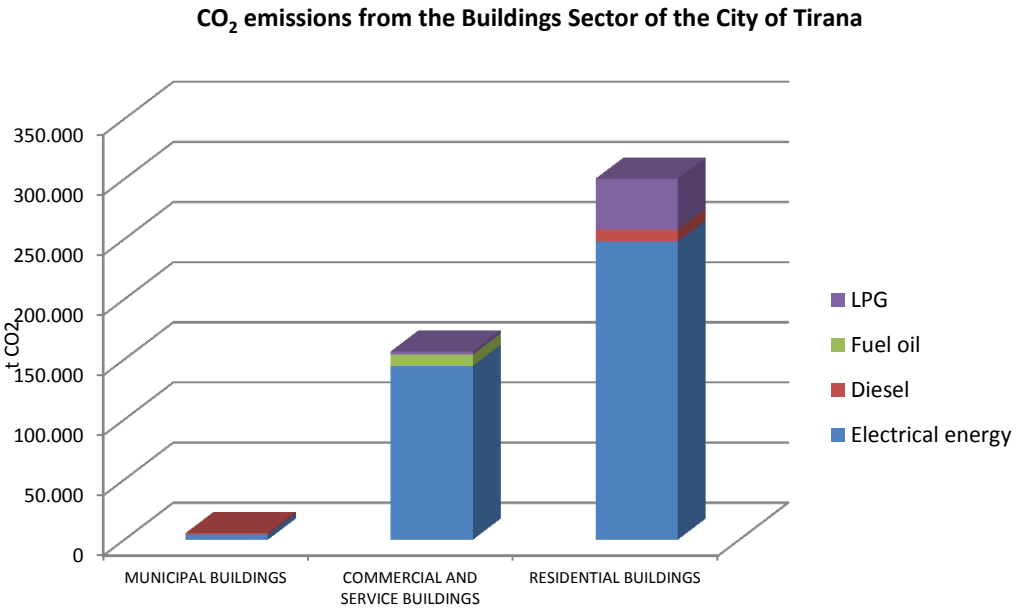

Figure 6.1 CO_2 emission in the buildings sector of the City of Tirana

The highest share in the total CO_2 emission belongs to indirect emission from electricity consumption with the share of 85,79%, followed by emissions from the LPG consumption with a share of 9,82%, emissions from diesel consumption (2,36%) and emissions from fuel oil consumption (2,02%) (figure 6.2).

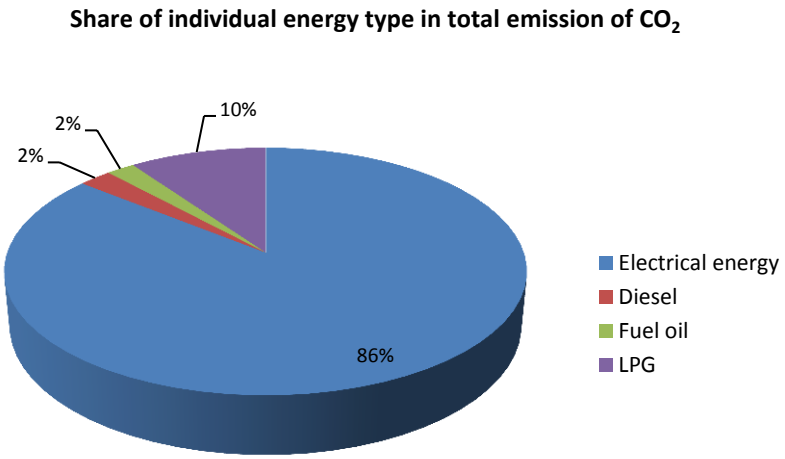

Figure 6.2 The share of individual energy type in total CO_2 emission of the building sector in the City of Tirana

Among the subsectors in the buildings sector, the highest share in the total emission belongs to residential buildings (64,90%), followed by commercial and service buildings (33,86%), and buildings owned by the City of Tirana (1,23%) (figure 6.3).

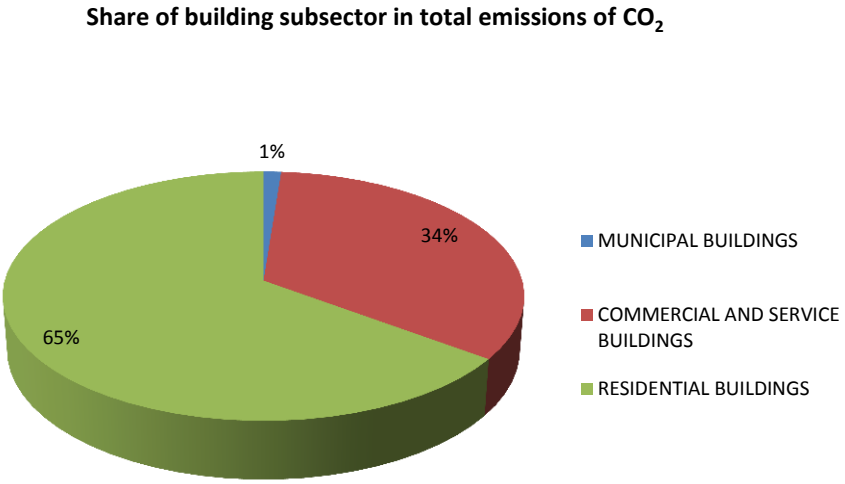

Figure 6.3 The share of buildings subsectors in total emissions of buildings sector in the City of Tirana

6.2 CO_2 Baseline Emission Inventory in the transport sector of the City of Tirana

6.2.1 Methodology for elaboration of the CO_2 Baseline Emission Inventory in the transport sector of the City of Tirana

In urban areas, the transport sector and in particular road transport, may be stated as the most significant air pollution factor, which contributes to a large extent to creation of greenhouse gases – CO_2, CH_4 and N_2O. CO_2 emission from motor vehicles depends on many parameters among which the most significant are: fuel quality, engine and vehicle construction performance, driving regime, external meteorological conditions, engine maintenance and its age, etc.

CO_2 baseline emission inventory for the transport sector of the City of Tirana is divided into three basic subsectors:

- CO_2 emission from vehicles owned by the City;
- CO_2 emission from public transport;
- CO_2 emission from personal and commercial vehicles.

COPERT IV computer programme, developed by the EEA (European Environmental Agency) within the EMEP/CORINAIR methodology was used for calculation of emission from fuel burning and evaporation from the transport sector.

6.2.2 CO_2 emission from vehicles owned by the City of Tirana

The subsector of vehicles owned by the City includes a fleet of 100 motor vehicles.

Table 6.3 shows CO_2 emission from the fleet owned by the City of Tirana in 2011 per consumed fuel.

Table 6.3 CO_2 emission from vehicles owned by the City of Tirana

Municipal fleet	Consumption		Emission
	l	TJ	t CO_2
Motor gasoline	74 520	2,51	173,87
Diesel	323 760	11,61	857,76
TOTAL	**398 280**	**14,12**	**1 031,63**

6.2.3 CO_2 emissions from the public transport of the City of Tirana

Public transport subsector of the City of Tirana covers public bus and taxi transport on the city territory. All buses of public bus transport of the City of Tirana consumed diesel fuel. 696 taxi vehicles out of 928 use diesel fuel and the rest consumed motor gasoline. In year 2011, the total consumption of diesel was 6 820 247 l, and of motor gasoline 662 500 l.

Fuel consumption and CO_2 emission in the public transport subsector are presented in table 6.4.

Table 6.4 Fuel consumption and CO_2 emission in the public transport subsector

CATEGORY	Energy consumption, TJ		Emission, t CO_2	
	Gasoline	Diesel	Gasoline	Diesel
Public bus transport	-	185,17	-	13 682,10
Taxi transport	22,29	59,38	1545,79	4 387,34
UKUPNO	**22,29**	**245,55**	**1545,79**	**18 069,45**

Of the total CO_2 emissions of public transport subsector in year 2011, 69,75% belongs to the bus transport, and 30,25% to the taxi transport.

6.2.4 CO_2 emission from personal and commercial vehicles

The personal and commercial vehicles subsector comprises the categories of personal vehicles and trucks, and the combined vehicles are a part of the personal vehicles category.

Total consumption per individual fuel type and CO_2 emission in the personal and commercial vehicles subsector in 2011 are presented in table 6.5.

Table 6.5 Total consumption and CO_2 emission in the personal and commercial vehicles subsector

Subsector	Fuel consumption, TJ	Emission t CO_2
Personal vehicles	1 815,87	128 259,15
Duty and utility vehicles	251,95	18 536,33
Moped and motorcycle	29,29	2 031,09
Buses	64,60	4 772,98
TOTAL	**2 161,71**	**153 599,55**

The result of calculations by COPERT IV model is expressed as total CO_2 emissions by individual vehicle categories.

6.2.5 Total CO_2 emission in the transport sector of the City of Tirana

Comparison of energy consumptions and CO_2 emissions per transport subsectors in the City of Tirana is presented in table 6.6.

Table 6.6 Total CO_2 emission in the transport sector of the City of Tirana

Subsector	Energy consumption, TJ				Emission, t CO_2			
	Gasoline	Diesel	UNP	Total	Gasoline	Diesel	UNP	Total
Municipal fleet	2,51	11,61		14,12	173,87	857,76		1 031,63
Public transport	22,29	244,55		266,84	1 545,79	18 069,45		19 615,23
Personal cars and commercial vehicles	1 283,56	852,23	25,92	2 161,71	88 993,33	62 970,66	1 635,56	153 599,55
TOTAL	**1 308,36**	**1 108,39**	**25,92**	**2 442,67**	**90 712,99**	**81 897,86**	**1 635,56**	**174 246,42**

Graphic overview of fuel consumption and the associated CO_2 emissions is presented in figures 6.4. and 6.5.

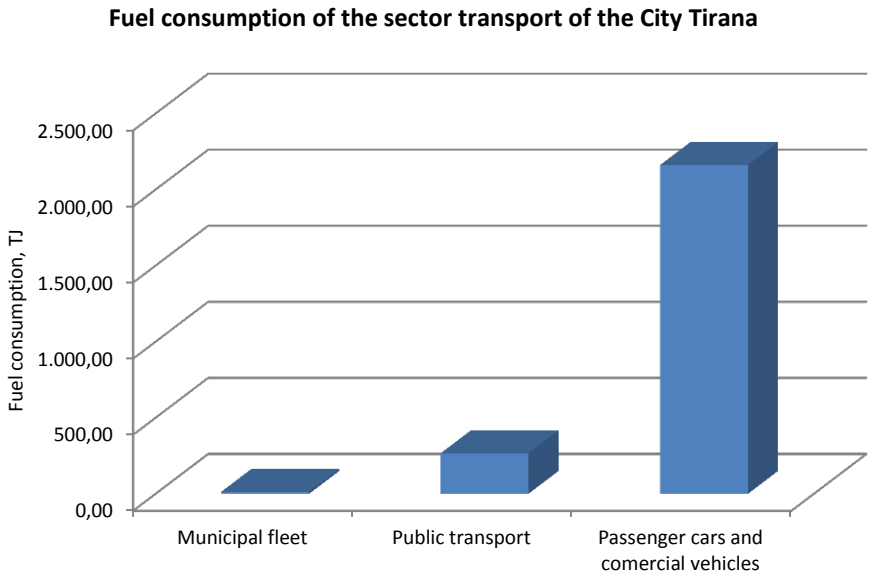

Figure 6.4 Comparison of energy consumptions per transport subsectors in the City of Tirana

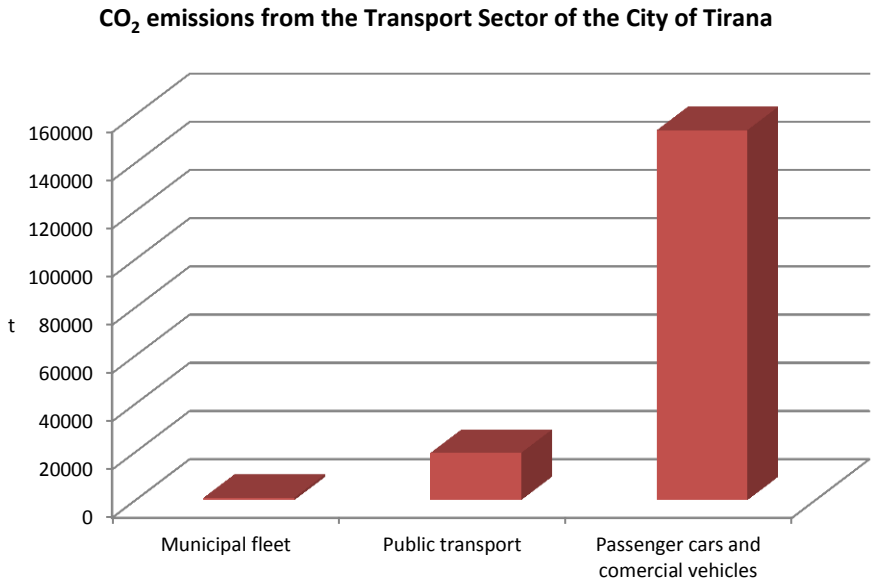

Figure 6.5 Comparison of CO_2 emissions per transport subsectors in the City of Tirana

Total CO_2 emissions from the transport sector of the City of Tirana in 2011 was je 174 246,42. The highest share in the emission belongs to the subsector of personal and commercial vehicles (88,15%), followed by public transport and vehicles owned by the City with common share of 11,85%.

6.3 CO_2 baseline emission inventory from the public lighting sector of the City of Tirana

CO_2 emission from the public lighting sector of the City of Tirana includes indirect CO_2 emission from electricity consumption of the public lighting system.

Table 6.7 shows electricity consumption and the associated CO_2 emission of the public lighting electrical network.

Table 6.7 Electricity consumption and the associated CO_2 emission of the public lighting electrical network

	Consumption of electrical energy		Emission
	kWh	TJ	t CO_2
Public lighting – electrical energy	6 895 022	24,82	1 965,08

Total emission in the public lighting sector is year 2011 was 1 965,08 t CO_2.

6.4 Total CO_2 baseline emission inventory (BEI) of the City of Tirana

6.4.1 Energy consumptions of the City of Tirana

CO_2 baseline emission inventory (BEI) of the City of Tirana in year 2011 includes CO_2 emission from the sectors of buildings, transport and public lighting based on energy consumption of individual sectors (table 6.8 and figure 6.6).

Table 6.8 Distribution of energy consumption of individual sector per energy type

Energy type	**Energy consumption, TJ**				**%**
	Transport	**Public Lighting**	**Buildings**	**Total per energy type**	**Share by energy sources**
Diesel	1 108,39	-	148,06	1 256,45	14,58%
Gasoline	1 308,36	-	-	1 308,36	15,18%
LPG	25,92	-	720,64	746,57	8,66%
Electrical energy	-	24,82	5 016,13	5 040,95	58,50%
Fuel oil	-	-	121,18	121,18	1,41%
Fuel wood	-	-	143,63	143,63	1,67%
TOTAL	**2 442,67**	**24,82**	**6 149,65**	**8 617,14**	**100,00%**
Share of individual sectors, %	**28,35%**	**0,29%**	**71,37%**	**100,00%**	**/**

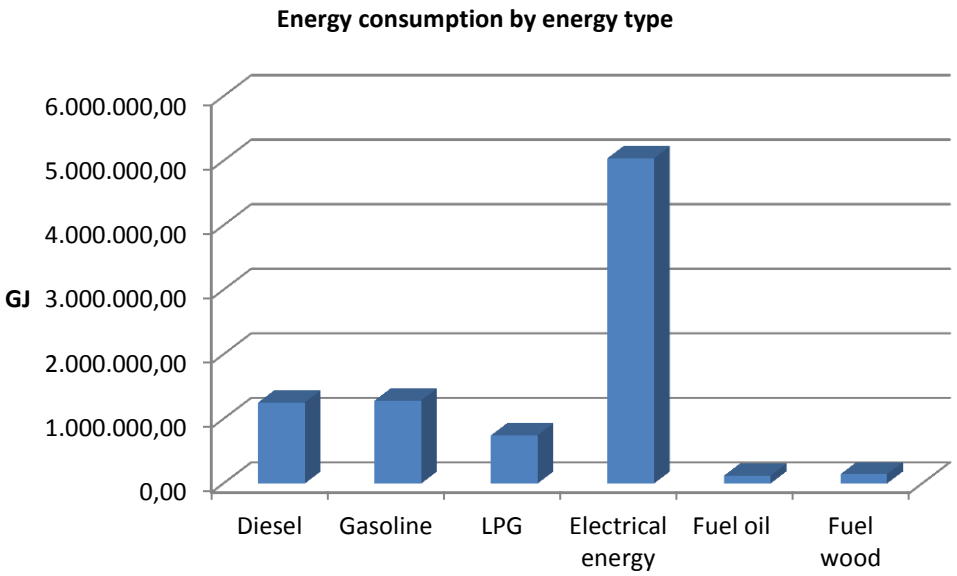

Figure 6.6 Structure of energy consumption per energy type in year 2011

Figure 6.6 shows that electricity is the energy type with the highest share in the total energy consumption. Electricity consumption in 2011 was 5 040,95 TJ, which is 58,50% of the total energy consumption. The energy types which have higher share, apart from electricity, are also motor gasoline and diesel with consumption of 1 308,36 TJ i 1 256,45 TJ, with common share of 29,76% of the total energy consumption in the City of Tirana.

Total energy consumption of the concerned sectors of the City of Tirana is 8 617,14 TJ, out of which 6 149,65 TJ was spent in buildings sector, followed by the transport sector with consumption of 2 442,67 (figure 6.7).

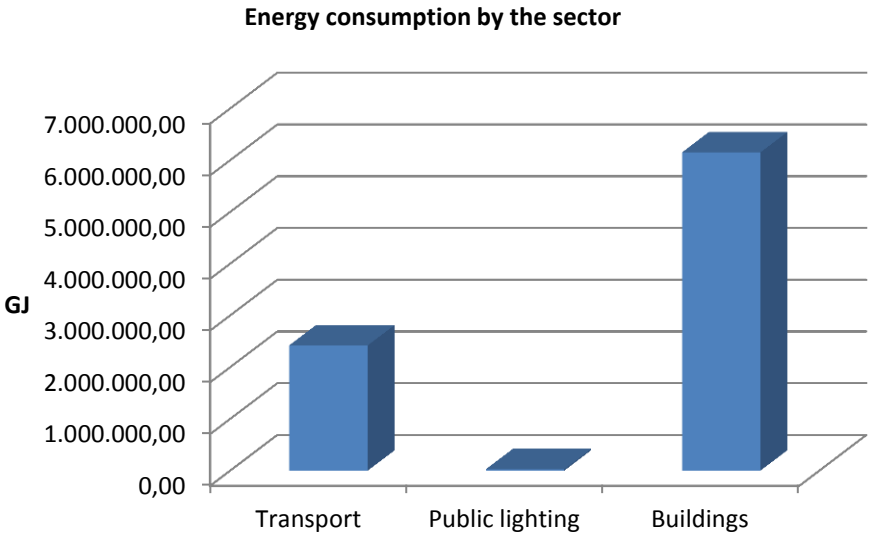

Figure 6.7 Structure of energy consumption per sector in year 2011

Figure 6.8 shows distribution of the total energy consumption in the City of Tirana per sector and energy type.

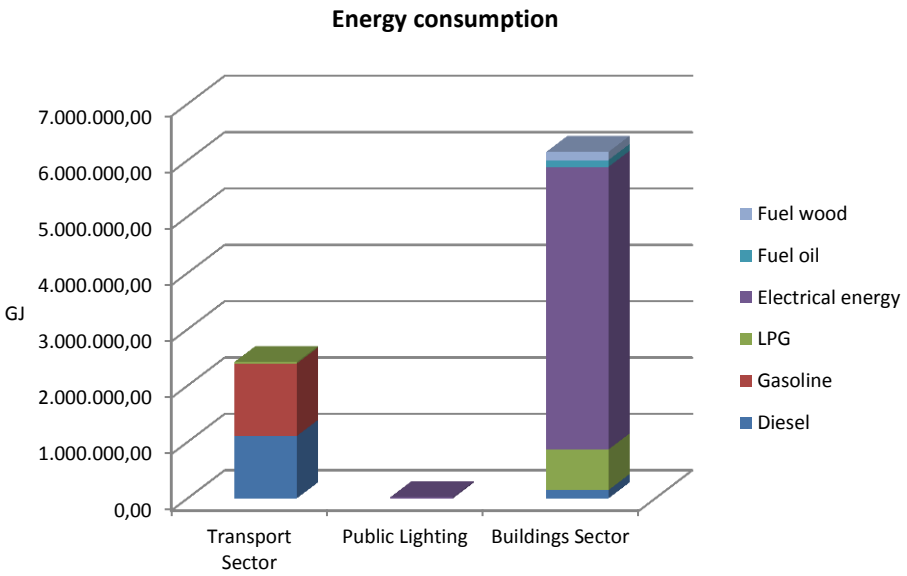

Figure 6.8 Distribution of the total energy consumption in the City of Tirana per sector and energy type

The highest share of 71,37% in the total energy consumption belongs to the buildings sector, followed by the transport sector with 28,35%. Electricity (5 040,95 TJ) is the most abundant energy type in buildings sector, while the transport sector consumed mostly gasoline (1 308,36 TJ) and diesel (1 256,45 TJ).

6.4.2 Total CO_2 emission of the City of Tirana

CO_2 baseline emission inventory of the City of Tirana covers direct CO_2 emissions occurring due to fuel burning and indirect CO_2 emission from electricity and thermal energy consumption from the sectors of buildings, transport and public lighting.

Table 6.9 shows CO_2 emissions per sector and energy type.

Table 6.9 CO_2 emissions per sector and energy type

Energy type	Emission, t CO_2				%
	Transport	Public Lighting	Buildings	Total per energy type	Share by energy sources
Diesel	81 897,86	-	10 939,96	92 837,82	**14,60%**
Gasoline	90 712,99	-	-	90 712,99	**14,02%**
LPG	1 635,56	-	45 472,73	47 108,30	**7,41%**
Electrical energy	-	1 965,08	397 110,55	399 075,64	**62,76%**
Fuel oil	-	-	9 357,82	9 357,82	**1,20%**
TOTAL	**174 246,42**	**1 965,08**	**462 881,07**	**639 092,57**	**100,00%**
Share of individual sectors, %	**27,26%**	**0,31%**	**72,43%**	**100,00%**	**/**

Figure 6.9 shows the total CO_2 emission per sector, and figure 6.10 shows the structure of emissions per energy type. Figure 6.11 gives an overview of the CO_2 emission structure per sector and energy type.

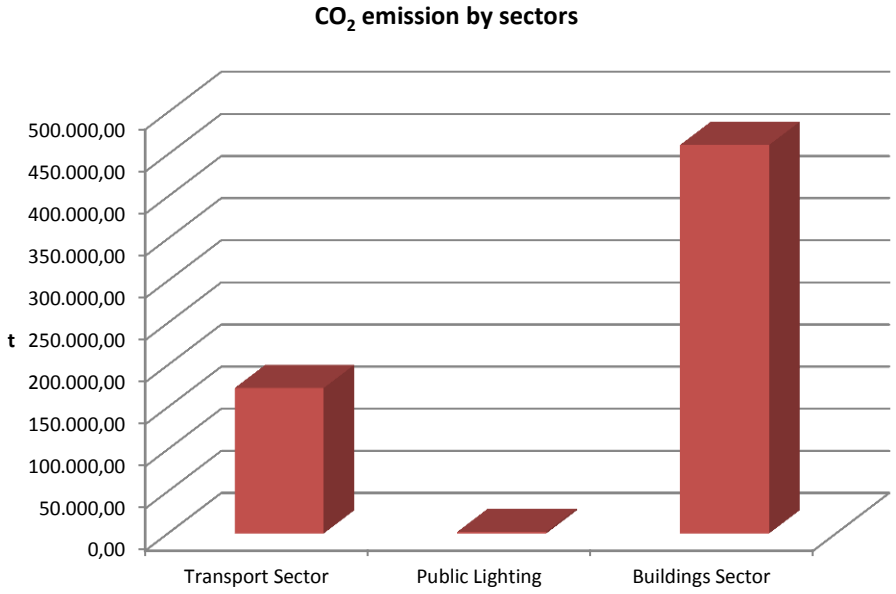

Figure 6.9 CO_2 emission per sector

Total emission of inventory is 639,09 kt CO_2. The largest emission source, and the source of energy consumption, is the building sector with the emission amounting to 462,88 kt CO_2, followed by the transport sector with the emission of 174,25 kt CO_2.

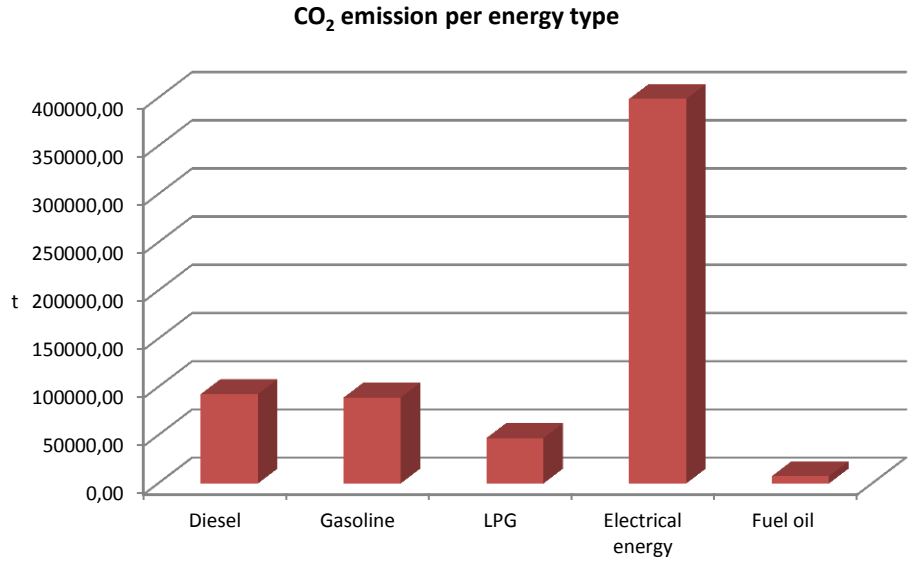

Figure 6.10 CO_2 emission per energy type

CO_2 emissions from electricity consumption in year 2011 was 399,08 kt CO_2 which is 62,76% of the total CO_2 emission, followed by diesel and gasoline with emissions of 92,84 kt CO_2 and 89,17 kt CO_2.

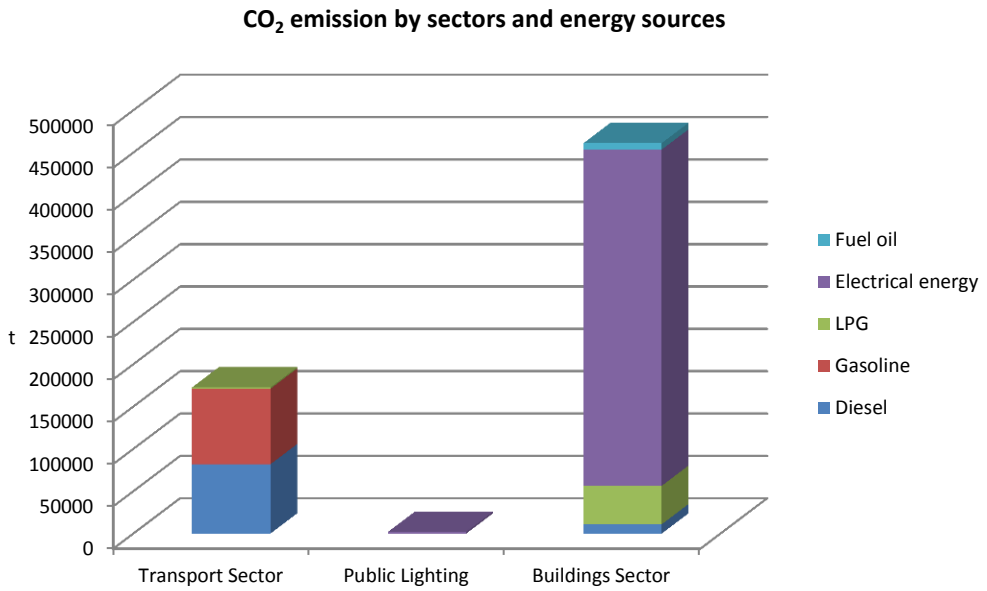

Figure 6.11 Structure of CO_2 emission per sector and energy type

The largest share of 72,53% of the total CO_2 emissions is from the building sector, followed by the transport sector with 27,16%. Emissions from electricity consumption (397,11 kt CO_2) is the most prevalent in the building sector, while in the transport sector the largest emissions occurred due to consumption of diesel fuel (92,84 kt CO_2) and gasoline (90,71 kt CO_2).

6.5 Conclusion

It is a known fact that over 50% of total greenhouse gasses emission is generated in cities and their surrounding areas. Furthermore, it is estimated that 80% of population in European Union lives in cities. Having in mind the above stated, it can be concluded that the role of the city authorities is particularly important for mitigation of climate changes and environment protection both at the city level, and the national and global level. The Baseline Emission Inventory of the City of Tirana for 2011 includes direct (fuel burning) and indirect (electricity consumption) CO_2 emissions from the three sectors of direct energy consumption: 1) buildings, 2) transport and 3) public lighting. Total CO_2 emission from the stated sectors in the City of Tirana in year 2011 was 639,09 kt CO_2.

7 An overview of potential measures for the reduction of CO_2 emissions by year 2020 in the City of Tirana

7.1 Introduction

In accordance to developed methodology used for the preparation of the Action Plan and recommendations of the European Commission, an overview of potential measures for the reduction of CO_2 emissions by year 2020 in the City of Tirana includes identified energy efficiency measures for the building, transport and public lighting sectors of the City of Tirana.

Measures for the building and the transport sectors are divided in several subcategories, depending on sub-sectors, for which certain measures are proposed, as well as their basic purposes and characteristics. Compared to the building and the transport sectors, measures aimed at improvement of energy efficiency of the public lighting are less numerous and they are not divided in subcategories.

This Chapter includes the survey of all measures which will result, if implemented, in CO_2 emissions reduction in the City of Tirana, no matter what will be investment costs, potentials of energy savings and economic-energy viability in case of their implementation. As for the measures which are feasible by 2020 and viable from an economic-energy standpoint, the final document will include descriptions of measures, expected energy savings and relevant CO_2 emissions, time schedule, evaluations of investment costs and bodies responsible for their implementation.

7.2 Measures of CO_2 Emissions Reduction for the Building Sector of the City of Tirana

In accordance with the recommendations of the European Commission and the real situation in the City of Tirana, priority measures and activities for the building sector are divided in the following five subcategories:

- General measures of CO_2 emissions reduction for the building sector;
- Promotional, informative and educational measures and activities;
- Measures for residential and public buildings owned by the City of Tirana;
- Measures for residential buildings sector;
- Measures for buildings dealing with commercial and service activities.

7.2.1 General Measures of CO_2 Emissions Reduction for the Building Sector

General measures include measures valid for the whole building sector of the City of Tirana divided in two main subcategories:

- Measures for elimination of obstacles preventing monitoring and control of energy consumption in the building sector of the City of Tirana;
- Co-financing schemes of the implementation of identified energy efficiency measures in all subsectors.

Measures for elimination of obstacles preventing monitoring and control of energy consumption in the building sector of the City of Tirana are:

1. Adopting of the methodology for collection of relevant energy indicators for the building sector of the City of Tirana in accordance to classification of buildings used in this Action Plan (1. buildings owned by the City of Tirana; 2. residential buildings; 3. buildings for commercial and service activities);
2. Collection of relevant energy indicators using the developed methodology per annum, month or day (depending on the type of indicator). Indicators will be collected both by automatic remote control systems and manually, for additional checking;
3. Preparation of information system of energy management for the City of Tirana which will contain all collected data and indicators and enable preparation of all necessary analyses.

It should be pointed out that these measures are very important, because it is not possible to monitor real tendencies in energy consumption and corresponding CO_2 emissions reduction in the building sector without collection of relevant energy indicators in accordance with unambiguous methodology. Consequently, it will not be possible to determine if the goal, set out by the Action Plan to be realized by 2020, was achieved or not.

The next sub-category of the general measures with strong influence on reduction of CO_2 emissions in the City of Tirana by 2020 includes the preparation of a co-financing scheme of the implementation of identified energy efficiency measures for the whole building sector. The experience of all energy sustainable and developed European cities shows that, without co-financing programmes and other different supporting programmes of the city administration, the implementation of sufficient, energy efficiency measures which should result in reduction of CO_2 emissions by more than 20%, by 2020, cannot be expected.

The proposed general measures of this sub-category are:

1. Application of stimulating schemes of the City of Tirana (non-refundable funds, subventions, and similar) for construction and reconstruction of buildings according to low-energy and passive standards;
2. Application of stimulating schemes of the City of Tirana (non-refundable funds, subventions, and similar) for usage of renewable sources of energy in buildings (photo-voltage systems, solar collectors, pellet boiler rooms, and similar).

Regarding this sub-category of the general measures, it is difficult to evaluate their influence on energy savings and corresponding reduction in CO_2 emissions in terms of quantity. But, it is sure that, without their implementation, it will not be possible to realize the planned goal of reduction of CO_2 emissions by more than 20% by 2020.

7.2.2 Promotional, Informative and Educational Measures and Activities

The subcategory of promotional, informative and educational measures and activities, aimed at reduction of CO_2 emissions and improvement of the life quality of all citizens of Tirana, includes:

1. Opening of Energy Efficiency Info Centers (EE info centers);
2. Placing of EE info showcases in different parts of the City;
3. Continuous informing of consumers on the modes of energy saving and actual energy topics at the back of energy bills (upon agreement with distributors);
4. Realization of thematic promotional-informative campaigns for raising awareness of citizens about energy efficiency in buildings:
   - How to build an energy efficient house?
   - Reconstruction of buildings according to the principles of sustainable construction;

- Energy certificates – energy consumption as a market category when buying, renting or rehabilitating buildings;
- Measures of energy efficiency in households – thermostat valves, solar systems for hot water; energy efficient woodworks; household appliances of A^{+++} energy class;
- Energy efficiency labels – Why only appliances of A^{+++} energy class should be bought?
- Stand-by mode also consumes energy! – plugging out appliances after use;
- Economical indoor lighting;
- Pellet heating;
- Solar collectors;
- Photovoltaic systems;
- Heat pumps;
- Intelligent house – What is it?
- What is a low-energy („ three-liters“) house?
- What is a passive („one-litre“) house?
- What is the Factor 10?

5. Organization of professional meetings for promotion of rational consumption of energy and reduction of CO_2 emissions;
6. Educational campaigns on designing, construction and usage of sustainable buildings for pre-determined groups of citizens:
   - Organization of meetings on energy efficiency in individual parts of the city;
   - How to save energy? – for preschool and school children;
   - Actions in schools: competitions in essay writing or drawings dealing with climate changes and energy savings, awarding prizes and exhibitions;
   - Preparation and distribution of picture books dealing with energy efficiency and usage of renewable energy sources;
7. Education system:
   - Introduction of educational courses on energy efficiency and usage of renewable sources of energy for pupils of high schools in Tirana;
   - Introduction of optional courses of lectures on energy efficiency and usage of renewable sources of energy in the curriculum of the Tirana University;
   - Workshops and seminars on modes of energy saving for employees/users of buildings owned by the City of Tirana;
   - Competitions of employees of the institutions owned by the City of Tirana on energy efficiency;
   - Organization of primary schools competitions on energy efficiency and renewable sources of energy with prizes for winners;
   - Financing of pupils and students works which promote energy efficiency;
   - Educational programmes dealing with energy saving for teachers in kindergartens;
8. Supporting of energy-efficient and sustainable construction in architectural and urban-architectural competitions announced in the City of Tirana:
   - Competitions for the new buildings;
   - Competitions for reconstruction;
   - Within the competition programmes, energy efficiency and sustainability should be included as a category of evaluation, with share of up to 20% of the total evaluation result of the project.

The influence of these measures on energy savings and corresponding CO_2 emissions reduction is difficult to evaluate in quantitative terms.

7.2.3 Measures for Buildings owned by the City of Tirana

The identified energy efficiency measures for buildings owned by the City can be divided in three groups, based on their basic characteristics:

- Preparation activities;
- Implementation projects;
- Legislative measures.

The preparation activities include the following measures and activities:

1. Introduction of *Information System for Energy Management* in the buildings owned by the City of Tirana:
   - centralized collection of all relevant data about buildings (construction characteristics, years of construction, year and description of reconstruction, energy consumption of all types of energy, monthly bills for consumed energy, and similar);
   - system of remote reading of consumed energy;
   - preparation and continuous updating of the buildings register;
   - performance of energy inspections in buildings;
2. Introduction of the 50-50% scheme according to which realized energy savings, i.e. avoided energy costs are equally divided between the City Administration, as the owner of the building, and users of the building. The previous practice is extremely demotivating, because owners of buildings (schools, kindergartens, etc.) who, due to their conscientious behavior, have considerable energy savings, but no benefits. The experience shows that the implementation of the 50-50% scheme results in change of behavior of the owner of the building. Consequently, the energy consumption is highly reduced.

The survey of specific projects with direct influence on energy consumption and reduction of CO_2 emissions is rather long. That is why the survey includes only the projects with the strongest influence on reduction of CO_2 emissions:

1. Installation of solar systems for hot water preparation in educational, cultural, sport and administration buildings owned by the City of Tirana;
2. Installation of thermostatic valve sets on radiators in the buildings owned by the City of Tirana;
3. Replacement of lighting installations in the educational institutions of the City of Tirana with modern, energy-efficient lighting installations in accordance with the European norms and regulations;
4. Heating insulation of facades and roofs of the buildings owned by the City of Tirana;
5. Installation of energy-efficient windows in the buildings owned by the City of Tirana;
6. Installation of thermometers in all rooms in all buildings owned by the City of Tirana;

The City legislative measures which will result in high reduction of CO_2 emissions are:

1. Introduction of Green Public Procurement for all equipment and services for the buildings owned by the City;
2. Making of the *Decision by the City of Tirana Assembly* which requires that all new buildings owned by the City of Tirana should use, at least, one optimal renewable source of energy (photovoltaic systems, solar collectors, heating pumps, etc.);

7.2.4 Measures for residential sector of City of Tirana (households)

The energy efficiency measures of this subsector can be divided in the ones for new buildings and the ones for existing buildings. The best way to reduce the energy consumption in the new buildings is to make rules which limit the energy consumption. The consumption in the new residential buildings will be considerably reduced if the above rules are successfully implemented.

The energy efficiency measures for existing residential buildings can be divided in two categories:

- Preparation activities;
- Feasible projects.

As in the case of the subsector of the City of Tirana owned buildings, the preparation activities will not have direct influence on the reduction of energy consumption and corresponding CO_2 emissions, but they will determine necessary prerequisites needed for their successful implementation.
The following measures are identified for this category:

1. Co-financing of the reconstruction of buildings' facades and roofs on the principles of sustainable construction;
2. Co-financing of installation of solar systems for hot water.

The feasible projects of energy efficiency for the existing and future residential buildings sector which have direct influence on the energy consumption and CO_2 emissions reduction are numerous. Only the ones with the strongest influence on the reduction of CO_2 emissions are proposed in this Action Plan:

1. Installation of solar systems for hot water in households by 2020;
2. Reconstruction of thermal insulation of external lining and rehabilitation of roofs of the existing residential buildings, on the principles of sustainable construction, by 2020;
3. Installation of thermostat valves on radiators in households in the city region.

Preparation and launching of co-financing programmes are important for successful implementation of the identified measures and activities.

7.2.5 Measures of Commercial and Services Buildings

The proposed measures for the existing commercial and services buildings include:

1. Development of conditions and criteria to obtain subsidies for the improvement of thermal insulation of a buildings in manner which complies with the valid regulations;
2. Development of conditions and criteria to obtain subsidies for the use of renewable energy sources:
    a. Photovoltaic systems;
    b. Heat pumps;
    c. Solar collectors.
3. Encouragement for establishment of the Green Procurement.

7.3 Measures of CO_2 emissions reduction of the transport sector in the City of Tirana

In accordance with the recommendations of the European Commission and the actual situation in the City of Tirana, the proposed measures and activities of the transport sector are divided into the following subcategories:

- Planned measures;
- Promotional, informative and educational measures and activities;
- Green public procurement;
- Measures for the City of Tirana owned vehicles;
- Measures for public transport;
- Measures for private and commercial vehicles;

7.3.1 Planned measures of CO_2 emissions reduction for the transport sector of the City of Tirana

The subcategory of planned measures of CO_2 emissions reduction for the transport sector of the City of Tirana includes all relevant measures which will result in general improvement of the quality of the city transport on one side, and considerable reduction of CO_2 emissions on the other side.

The category of planned measures of CO_2 emissions reduction for the transport sector includes:

1. Introduction of *Information system for traffic monitoring*;
    a. This measure includes installation of a modern traffic signalization system to be used for communication with drivers, installation of measurement devices for monitoring of traffic flow and the environment, which enables operative services to have control of the road situation, foresee dangerous situations and prevent eventual traffic accidents;
2. Measures for improvement of traffic flow in the City of Tirana;
    a. Giving priorities to public transport vehicles along separate tracks;
    b. Installation of the system for giving priorities to public transport vehicles at crossroads;
    c. Determination of certain limitations for cargo transport in order to relieve internal city network;
3. Introduction of traffic pollution fees;
    a. Based on the experiences of EC cities, it is possible to introduce fees for the traffic pollution of the center of Tirana. Redirecting the traffic away from the center of Tirana will not have a direct influence on CO_2 emissions reduction on the whole area of city, but it will indirectly decrease the number of vehicles and increase usage of the city public transport. The collected compensations for traffic pollution can be used for financing the improvement of the public transport quality;
4. Measures for traffic safety improvement:
    a. Regulation of driving speed by installing radar sets which show speed;
    b. Gradual installation of LED traffic signs in all dangerous parts in the city.

7.3.2 Promotional, Informative and Educational Measures and Activities

Promotional, informative and educational measures and activities aimed at improvement of traffic quality and reduction of CO_2 emissions in Tirana are:

1. Promotion of the car-sharing model in order to increase the number of passengers;
2. Informing and training on environmentally friendly ways of driving (driving schools);
3. Promotion of usage of alternative fuels;
4. Organization of informative-demonstrative workshops on usage of alternative fuel vehicles (electric power, natural gas, pellets, etc.), with possibility to hire alternative fuel vehicles (for citizens);
5. Organization of the Mobility Week in the City;
6. Organization of meeting, workshops and other gatherings, carrying out of polls and research analyses, distribution of informative and promotion leaflets, etc.;
7. Campaign: *One day a week without a car;*
8. Campaign: *Bicycle is healthier and much cheaper!*

7.3.3 Green Public Procurement

This subcategory of measures includes the following measures and activities:

1. Introduction of the criteria of Green Public Procurement for the city owned vehicles;
2. Introduction of the criteria of Green Public Procurement for the public transport vehicles.

7.3.4 Measures for the vehicles owned by the City of Tirana

The subcategory of measures for the city owned vehicles includes:

1. Procurement of new vehicles with reduced emission of greenhouse gases (alternative fuels) in accordance to criteria of Green Public Procurement.

7.3.5 Measures of the public transport in the City of Tirana

The measures for the public transport in the City of Tirana include those measures which, if implemented, increase quality and usage of the public transport and decrease the usage of private cars. At the beginning, the implementation of these measures will not reduce CO_2 emissions in Tirana. The reduction of CO_2 emissions will follow, because of a decreased number of private cars in usage. The measures for the public transport of Tirana are divided in three groups, depending on the type of transportation:

- Measures aimed at improvement of the quality of the bus transport;
- Measures aimed at improvement of the bicycle transportation in the Tirana region.

The subcategory of the public transport measures includes:

1. Measures aimed at improvement of the quality of the bus transport:
   a. Replacement of existing, old buses with buses on alternative fuels;
   b. Installation of LED displays which show arrivals of buses at all bus stops;
   c. Using of mini buses for bus lines with expected smaller number of passengers in evening and night hours, instead of standard ones;
   d. Improvement of equipment and infrastructure of bus stops and stop shelters;

e. Stimulation of production of bio-diesel fuel from waste eatable oil for needs of the public bus transport;

2. Measures aimed at improvement of the bicycle transportation in the City of Tirana:
   a. Forming of the network of bicycles for renting, equipped with IT devices to prevent stealing. Adequate store-houses and servicing should also be provided.
   b. Construction of the new bicycle tracks and settlement of the existing ones in the Tirana region.

7.3.6 Measures of the private and commercial vehicles

The proposed measures aiming at more rational usage of private and commercial vehicles in the City of Tirana include:

1. Follow up of charging conventional vehicles for entrances into the Ring between 6 AM and 11 PM and expend the measure to other highly jammed parts of the City;
2. Exception of charging for vehicles powered by alternative fuels;
3. Permission to use the yellow track for vehicles with 3 or more passengers.

7.4 Measures of the public lighting sector

The measures aiming at reduction of energy consumption and lighting pollution in the Public Lighting Sector of the City of Tirana are the following:

1. Replacement of the existing with more energy efficient and environmentally friendly lighting fixtures with modern electronic ballasts;
2. Setting up a public lighting register on a GIS platform.

As it was stated in the introduction sub-chapter, this chapter contains an overview of all measures and activities in the building, transportation and public lighting sectors which will result in reduction of CO_2 emissions, if implemented successfully.
Chapter 8 of this Action Plan gives the main indicators for identified, cost-benefit optimal measures for three sectors of energy consumption in the City of Tirana.

8 Temporal and financial framework for the implementation of measures and activities for the City of Tirana

8.1 Introduction

The previous chapter presents a comprehensive overview of potential measures and activities related to the Sustainable Energy Action Plan of the City of Tirana in the sectors of buildings, transportation and public lighting. For easy reference each measure was concisely presented in a table. In the attempt to fulfil the Action Plan's aim and achieve a minimum of 21% reduction of CO_2 by 2020 compared to the referential year of 2011, only a partial realisation of the foreseen measures will suffice, and its achievement hinges on the financial, temporal and organizational parameters.
The identified measures for CO_2 reduction are depicted in tables further on in this chapter, whereas each measure is accompanied by the following parameters:

- Time frame for measure implementation;
- Bodies responsible for measure implementation;
- Investment cost assessment for measure implementation;
- Estimation of energy saving potential;
- Estimation of the CO_2 reduction;
- Possible financial instrument for measure implementation;
- Short description of measure and manner of implementation.

The measures, along with the relevant parameters, are divided into the three following categories:

- Measures for CO_2 emission reduction in the buildings sector of the City of Tirana;
- Measures for CO_2 emission reduction in the transport sector of the City of Tirana;
- Measures for CO_2 emission reduction in the public-lighting sector of the City of Tirana.

The possible financial instruments for the implementation of each measure mentioned are presented in the chapter 10 of this Action plan.

8.2 Measures for CO_2 emission reduction in the buildings sector of the City of Tirana

Following in the text is an overview of the CO_2 reduction measures for the buildings sector of the City of Tirana, divided into four categories:

- General measures;
- Measures for buildings owned by the City;
- Measures for residential buildings;
- Measures for the commercial and service buildings.

The category of general measures in buildings encompasses the following set of measures:

- Promotion, education and awareness change of the city residents;
- Remaining measures pertaining to the overall buildings sector in the City of Tirana.

8.2.1 General measures

Number/Measure/activity name	1. Education and change of the behaviour of employees/users of buildings owned by the City of Tirana
Implementing body	- The City of Tirana, General Directorate of Service Planning and Management
Implementation beginning/end (years)	2014- 2020
Cost assessment (measure individual or total assessment) €	35 000
Energy saving assessment (MWh)	296 MWh of electricity 721 MWh of thermal energy
CO_2-emission-reduction assessment (t CO_2)	285,3
Funding for measure implementation	• Budget of the City of Tirana • The Budget of the Republic of Albania • Donors
Short description/commentary	This measure includes a range of educational activities that require regular undertaking: • Organising educational workshops on energy savings; • Preparation and distribution of educational materials (flyers, posters, stickers, etc.) • Organising panel discussions and the like Besides the educational activities foreseen within this measure, there is the need to introduce a stimulating energy-saving arrangement (for e.g. 50/50 arrangement) within which a part of financial fund coming from the realised energy savings remains at the disposal of individual institutions in which the savings were realised. Energy savings achieved by implementing measures aimed at educating and rising of awareness for the users of City-owned buildings is rather difficult to quantify. Based on the experiences of other European cities, there is an opinion that the continuous educational activities for promotion and information throughout the following decade will result in 5% savings of electricity and thermal energy in buildings owned by the City of Tirana in year 2011. The total thermal energy consumption in City-owned buildings in 2011 was 14 422,26 MWh, whereas electricity consumption amounted to 5 925,5 MWh.

Number/Measure/activity name	2. Education and promotion of energy efficiency for the citizens of Tirana
Implementing body	- The City of Tirana - Ministry of Economy, Trade and Energy - National Agency of Natural Resources - NGO sector
Implementation beginning/end (years)	2013- 2020
Cost assessment (measure individual or total assessment) €	96 000
Energy saving assessment (MWh)	38 582 MWh of electricity 96 449 MWh of thermal energy
CO_2-emission-reduction assessment (t CO_2)	35 889,3
Funding for measure implementation	• Budget of the City of Tirana • The Budget of the Republic of Albania
Short description/commentary	This measure includes several activities implemented regularly: 1. Setting EE info corners in different parts of the City of Tirana; 2. Continuous customer information regarding both energy saving and current energy-related issues on the back of the energy bills; 3. Carrying out theme-specific promotion and information campaigns for raising citizens' awareness about energy efficiency of buildings: • How to construct an EE house?; • Building reconstruction in line with the principles for a sustainable building; • Energy certificates – energy consumption as a market category in buying, renting and repair of buildings; • Measures for energy efficiency in households – thermostatic valves, solar systems for preparation of sanitary hot water, energy-efficient carpentry, home appliances with an "A^{+++}" energy label; • Labelling energy efficiency - Why buy only energy class A^{+++} appliances? • Standby mode consumes electricity, too! – turning off home appliances from the energy grid after use; • Energy-efficient indoor lighting; • Biomass heating; • Solar collectors; • Heat pumps; • Intelligent building – what is it?; • What is a low-energy ("three-litre") house?; • What is a passive ("one-litre") house?; • What is *Factor 10*?; 4. Organising meetings to promote rational energy use and reduce CO_2 emissions. Saving energy by implementing measures that include education and awareness raising of various target groups is difficult to quantify. Based on experiences of the European cities, by 2020 the continuous implementation of these measures should result in a 8% reduction of thermal and electrical energy consumption.

Number/Measure/activity name	3. Minimum requirements on thermal quality of newly and existing buildings
Implementing body	- City of Tirana, General Directorate of Service Planning and Management - Ministry of Economy, Trade and Energy - National Agency of Natural Resources - Ministry of Urban Planning and Transport
Implementation beginning/end (years)	2014 - 2020
Cost assessment (measure individual or total assessment) €	120 000 €
Energy saving assessment (MWh)	52 000 MWh of thermal energy
CO_2-emission-reduction assessment (t CO_2)	14 005,9
Funding for measure implementation	The Government of Albania (Ministry of Finance and Ministry of Economy, Trade and Energy) will fund the improvement of the legal framework on minimum requirements on thermal quality. The Municipality will cover only the costs for the implementation of the legal framework at local level, such as the cost of inspections, office of inspectors etc.
Short description/commentary	Building codes and enforcement of them represent an efficient tool to secure the compliance of building construction companies with best practice solutions through official building codes.

Number/Measure/activity name	4. Package of promotional instruments for the installation of solar collectors for water heating
Implementing body	- City of Tirana, - UNDP Solar Water Heating Project - Ministry of Economy, Trade and Energy - National Agency of Natural Resources
Implementation beginning/end (years)	2013 - 2020
Cost assessment (measure individual or total assessment) €	120 000
Energy saving assessment (MWh)	Included in measure 2
CO_2-emission-reduction assessment (t CO_2)	
Funding for measure implementation	Funding will be provided mainly by the existing UNDP Project on the Promotion of the Market of Solar Water Heaters. Additional funding may be provided by the City.
Short description/commentary	The successful implementation of UNDP Solar Water Heating Project will result in an increased utilization solar water heating in residential buildings and thus to a large reduction of electricity consumption for water heating.

Number/Measure/activity name	5. Energy advice network – Energy Efficiency Info Centers
Implementing body	- City of Tirana - National Agency of Natural Resources
Implementation beginning/end (years)	2013 - 2020
Cost assessment (measure individual or total assessment) €	100 000
Energy saving assessment (MWh)	Included in measure 2
CO_2-emission-reduction assessment (t CO_2)	
Funding for measure implementation	Funding for the Energy Advice Network and Energy Efficiency Info Centres will be provided by donors and by the City.

Short description/commentary	The implementation of an Energy Advice Network is a necessary "follow-up" to awareness campaigns, built up stepwise. In the first step, information centers for households will be built up.

Number/Measure/activity name	**6. Further education and training for energy professionals**
Implementing body	- National Agency of Natural Resources - Energy Efficiency Centre Albania – EU - Vocational Education Centre - City of Tirana - Chamber of Engineers (will be created soon, the legal basis is under development)
Implementation beginning/end (years)	2014 - 2020
Cost assessment (measure individual or total assessment) €	100 000
Energy saving assessment (MWh)	Included in measure 2
CO_2-emission-reduction assessment (t CO_2)	
Funding for measure implementation	Funding for this measure will be provided by the donors, such as GIZ and Swisscontact who support the GoA in improvement of Vocational Education and Training System, as well as by the Chamber of Engineers
Short description/commentary	The draft of Energy Efficiency Law already foresees energy audits. For professionals in the construction sector (designers and construction workers), specialized training courses should be developed. In addition, licensing procedures for further education will be developed.

Number/Measure/activity name	**7. Certification sheme for buildings**
Implementing body	- City of Tirana - National Agency of Natural Resources - Independent auditors (certified)
Implementation beginning/end (years)	2014 - 2020
Cost assessment (measure individual or total assessment) €	120 000
Energy saving assessment (MWh)	13 956 of thermal energy
CO_2-emission-reduction assessment (t CO_2)	3 759,0
Funding for measure implementation	Funding will be paid by the institutions that are obliged to conduct an energy audit, as well as by the owners of the apartments that will be rented or sold out.
Short description/commentary	In compliance with the drafted legal framework (Energy Efficiency Law), a building certification scheme should be introduced in order to make energy consumption of buildings more transparent to customers and /or tenants. According to the requirements of EPBD II, transposed also in the Draft EE Law, every apartment sold or rented must have an energy certificate.

8.2.2 Buildings owned by the City of Tirana

Number/Measure/activity name	8. Installation of solar collectors for hot water preparation in buildings owned by the City of Tirana
Implementing body	- The City of Tirana - Ministry of Economy, Trade and Energy of the Republic of Albania
Implementation beginning/end (years)	2013- 2020
Cost assessment (measure individual or total assessment) €	600 000 EUR
Energy saving assessment (MWh)	865 MWh of thermal energy
CO_2-emission-reduction assessment (t CO_2)	241,1
Funding for measure implementation	• Budget of the City of Tirana • Donor Contribution e.g. UNDP Project on Solar Thermal Water Heaters
Short description/commentary	50% of City-owned buildings by 2020 will have built solar hot water collectors. The total thermal energy consumption of the City-owned buildings as measured in 2011 was 14 422 MWh. The expected thermal energy saving for hot water preparation is estimated at 6%.

Number/Measure/activity name	9. Modernisation of the lighting system in 600 classrooms in educational institutions owned by the City of Tirana
Implementing body	- The City of Tirana
Implementation beginning/end (years)	2013-2020
Cost assessment (measure individual or total assessment) M€	810 000 € in total
Energy saving assessment (MWh)	104,4 MWh of electricity
CO_2-emission-reduction assessment (t CO_2)	29,8
Funding for measure implementation	• Budget of the City of Tirana • Ministry of Education
Short description/commentary	According to collecting data there are 14 secondary and 57 primary schools in the City of Tirana. The financial cost assessment for modernising the lighting in an average classroom (58 m^2) amounts to 1 350 €. The electricity saving assessment for an average classroom upon measure's implementation is estimated at 174 kWh/year. The total electricity saving from modernising the lighting in 600 classrooms by 2020 is estimated at 104,4 MWh.

Number/Measure/activity name	10. Installation of thermometers in every room of the buildings owned by the City of Tirana
Implementing body	- The City of Tirana
Implementation beginning/end (years)	2013
Cost assessment (measure individual or total assessment) €	1,5 €/ thermometer, total of 4 500 €
Energy saving assessment (MWh)	288 MWh of thermal energy
CO_2-emission-reduction assessment (t CO_2/year)	80,3
Funding for measure implementation	• Budget of the City of Tirana
Short description/commentary	The installation of walled thermometers in every room (offices, meeting rooms, etc.) offers insight into the rooms' temperature and allows for temperature regulation by properly airing the rooms, and by regulating the heating/cooling

	systems. Besides mounting thermometers to walls, the measure foresees these initial educational activities: • The thermometer will bear a sign saying: "1 °C saves up to 6% energy." • Upon room thermometer installation, users will be informed about the aim of the measure and the ways to its successful implementation. • Preparation and distribution of flyers and the like. The total investment cost assessment for implementing this measure in approximately 4 000 rooms of the City owned buildings is estimated at approximately 4 500 €. Based on international experiences, this measure can render as much as a 2% reduction of thermal energy consumption in buildings owned by the City of Tirana. The measure may be implemented immediately, since it is neither financially nor logistically demanding for implementation.

Number/Measure/activity name	**11. Thermal insulation of facades and roofs of 100 buildings owned by the City of Tirana**
Implementing body	- The City of Tirana
Implementation beginning/end (years)	2014- 2020
Cost assessment (measure individual or total assessment) M€	1,25
Energy saving assessment (MWh)	4 000 MWh of thermal energy
CO_2-emission-reduction assessment (t CO_2)	1 114,9
Funding for measure implementation	• Budget of the City of Tirana
Short description/commentary	The complete installation of facade-wall and roof thermal insulation for 50 City-owned buildings should be done on an estimated area of around 50 000 m^2. The thermal energy saving is deemed at approximately 80 kWh/m^2, whereas investment cost is around 25 €/m^2. It is recommended that the priority in thermal insulation should be given to educational institutions in need of reconstruction (75 kindergartens, 57 primary schools and 14 secondary schools in the City of Tirana).

Number/Measure/activity name	**12. Installation of high-performance, energy- efficient windows in 100 buildings owned by the City of Tirana**
Implementing body	• The City of Tirana
Implementation beginning/end (years)	2014 - 2020
Cost assessment (measure individual or total assessment) M€	1,5
Energy saving assessment (MWh)	1 750 MWh of thermal energy
CO_2-emission-reduction assessment (t CO_2)	487,7
Funding for measure implementation	• Budget of the City of Tirana
Short description/commentary	The installation of high-performance, energy-efficient windows in 50 buildings owned by the City of Tirana will be carried out according to a calculated heated square of 50 000 m^2. The thermal energy saving is estimated at 35 kWh/m^2, whereas the investment cost is around 30 €/m^2. A simultaneous implementation of this and the previous measure is recommended.

Number/Measure/activity name	13. Installation of thermostat sets on radiators in all buildings owned by the City of Tirana
Implementing body	- The City of Tirana
Implementation beginning/end (years)	2013- 2020
Cost assessment (measure individual or total assessment) M€	
Energy saving assessment (MWh)	80 MWh of thermal energy
CO_2-emission-reduction assessment (t CO_2)	22,3
Funding for measure implementation	• Budget of the City of Tirana • Regional funds (EIB, KfW)
Short description/commentary	All the buildings that are renovated have heating and cooling systems and have thermostats. This measure foresees the installation of thermal sets in the rest of City-owned buildings by 2020, the total heated area of which is cca 5 000 m^2. Based on results gained from numerous energy audits in public buildings, the average number of radiators amounts to 0,0517 radiators/m^2. Therefore, this measure should encompass the installation of 258 thermostat sets on the radiators. Thermal energy saving is estimated at 16 kWh/m^2, whereas the price for a thermostat set is around 40 €. The buildings owned by the city that do not have central heating systems, have air conditioners for each room. The buildings that should be renovated plan the installation of low energy consumption systems, e.g. condensing boilers or Inverter heat pumps where applicable.

Number/Measure/activity name	14. Introduction of Green Public Procurement criteria for energy appliances in buildings owned by the City of Tirana
Implementing body	- The City of Tirana
Implementation beginning/end (years)	2013- 2020
Cost assessment (measure individual or total assessment) M€	No cost
Energy saving assessment (MWh)	889 MWh of electricity
CO_2-emission-reduction assessment (t CO_2)	253,4
Funding for measure implementation	• Legislative measure
Short description/commentary	This measure aims at stimulating the purchase of energy efficient appliances for the needs of all buildings owned by the City of Tirana through the introduction of *Green Public Procurement* policy. The criteria in buying such appliances are to be previously defined and standardised in a separate Rulebook, and all newly acquired appliances must meet the set criteria. Upon measure implementation, electricity saving by 2020 is deemed at 15%, compared to 2011.

Number/Measure/activity name	15. Installation of energy-saving lamps in buildings owned by the City of Tirana
Implementing body	- The City of Tirana
Implementation beginning/end (years)	2013- 2017
Cost assessment (measure individual or total assessment) M€	No cost
Energy saving assessment (MWh)	356 MWh of electricity
CO_2-emission-reduction assessment (t CO_2)	101,5
Funding for measure implementation	• Legislative measures
Short description/commentary	EU Regulation pertaining to lighting products (EC Regulation 244/2009) prescribes that by the year 2016 the manufacture of traditional incandescent lamps will cease, resulting in their replacement by energy saving lamps. This measure aims at replacing conventional lamps with energy saving lamps in all City-owned buildings by the year 2017. This measure will yield a 6% decrease of total electricity consumption by 2020 in buildings owned by the City of Tirana.

8.2.3 Residential sector of the City of Tirana

Number/Measure/activity name	16. Social housing project
Implementing body	- Ministry of Public Works and Transport - National Housing Entity - Ministry of Labour, Social Affairs and Equal Opportunities - Donors
Implementation beginning/end (years)	2014 - 2020
Cost assessment (measure individual or total assessment) €	400 000
Energy saving assessment (MWh)	2 300 MWh of thermal energy
CO_2-emission-reduction assessment (t CO_2)	593,6
Funding for measure implementation	• Budget of the Republic of Albania • Donors
Short description/commentary	Government programme for social housing foresees the construction of 250 flats for low-income families by 2020. The programme envisages the lowest possible price for constructing the residential buildings, thus making them most affordable for low-income families. The programme does not specify whether the construction of the buildings in question should meet all technical norms and requirements in terms of buildings' general energy efficiency (for e.g. facade-wall insulation, energy-efficient doors and windows, room heating). These elements will initially increase investment cost. It is considered that during this period there will be build 20,000 square meters of social houses in Tirana. Considering an increase in investment costs with 20 EUR per square meter due to the improvement of EE standards, the total investment only for EE measures will be 400,000 EUR. The aim is to implement the energy efficiency norms for buildings during their construction. This will enable a long-term reduction of energy consumption and lower electricity bills for low-income families.

Number/Measure/activity name	17. Subsidy scheme for comprehensive refurbishment of Multi Family Houses (MFH)
Implementing body	- City of Tirana - Ministry of Finance - Donor organisations
Implementation beginning/end (years)	2014 - 2020
Cost assessment (measure individual or total assessment) €	75 000 per year, 525 000 in total
Energy saving assessment (MWh)	49 656 MWh of thermal energy
CO_2-emission-reduction assessment (t CO_2)	12 792,7
Funding for measure implementation	Financial means will become available through the Energy Efficiency Fund.
Short description/commentary	The subsidy scheme is based on the following criterion: - minimum thermal quality for obtaining a subsidy; - increasing subsidy with improving thermal quality after renovation; - in the condominium sector: additional social support for low-income families By far, the prevailing share of MFH buildings in Tirana consists of condominium buildings. The flat owners are not able to cover all costs for the comprehensive refurbishment of MFH, which usually is a major barrier to refurbishment or leads to low-quality refurbishment. Therefore, subsidy schemes are important instruments for an increase of the thermal renovation rate.

Number/Measure/activity name	18. Transposition to practice the new legal framework for condominium houses
Implementing body	- City of Tirana
Implementation beginning/end (years)	2014 - 2020
Cost assessment (measure individual or total assessment) €	50 000 per year, 350 000 in total
Energy saving assessment (MWh)	24 828 MWh of thermal energy
CO_2-emission-reduction assessment (t CO_2)	6 408,1
Funding for measure implementation	Financial means will become available through the Energy Efficiency Fund.
Short description/commentary	The Albanian legal framework for refurbishment of condominium houses has been recently improved foreseeing i.a. monthly payments to repair funds. The implementation in practice, however, lags behind. Information and advice needs to be increased in this field. Comprehensive thermal refurbishment of Multy Family Houses is only feasible if the housing law offers a favourable framework for refurbishment mainly for condominium houses.

Number/Measure/activity name	19. Subsidy sheme for installation of solar collectors in 1000 existing residential buildings
Implementing body	- Private sector - City of Tirana - Energy Efficiency Fund
Implementation beginning/end (years)	2013-2020
Cost assessment (measure individual or total assessment) M€	1 200 000 (15% of this amount will be subsidized, 85% will be paid by the owners of apartments)
Energy saving assessment (MWh)	2 600 of thermal energy
CO_2-emission-reduction assessment (t CO_2)	671,1

Funding for measure implementation	• City budget • Donors • Private sector • Financial Institutions • Energy Efficiency Fund
Short description/commentary	The economic justification and the relatively favourable return on investment may be reached through the great demand for hot water on a daily and yearly basis. The following steps are needed to reach an efficient implementation of this measure: • Subsidies of more than 15% from City budget or/and different financial institutions • The academic and scientific institutions should develop applicable projects to aid domestic manufacturers of equipment, • To found and accredit laboratories to test the quality of manufactured equipment, • To provide an information campaign enabling consumers to get acquainted with the quality of the equipment offered and the benefits of its use. Furthermore, as both an alternative and an addition to solar collectors are the geothermal heat pumps, which provide efficient heating and cooling for buildings with an efficiency of above 400%, calculated in terms of energy consumption (1 kWh electricity provides up to 4 kWh of thermal energy). There is an additional benefit from these systems during summer, when the preparation of sanitary hot water is cost-free. There is no subsidy scheme for heat pumps at the moment but it should be considered in the future.

Number/Measure/activity name	**20. Regulation for mandatory solar collectors in new residential buildings**
Implementing body	- Ministry of Economy, Trade and Energy of the Republic of Albania
Implementation beginning/end (years)	2013-2020
Cost assessment (measure individual or total assessment) M€	No cost
Energy saving assessment (MWh)	40 000 MWh of thermal energy
CO_2-emission-reduction assessment (t CO_2)	10 324,0
Funding for measure implementation	Legislative measure
Short description/commentary	The new Law on Renewable Energy Sources (still in draft) makes the installation of solar water heaters obligatory for new buildings. The new Urban City Plan has foreseen an increase of about 20% of the number of inhabitants in Tirana. It is assumed that the number of the new apartments build in the period 2013 – 2020 will be around 15 000.

Number/Measure/activity name	21. Installation of energy saving lamps in all households in the City of Tirana
Implementing body	- Market Laws
Implementation beginning/end (years)	2013- 2017
Cost assessment (measure individual or total assessment) M€	No cost
Energy saving assessment (MWh)	65 803 MWh of electricity
CO_2-emission-reduction assessment (t CO_2)	18 753,9
Funding for measure implementation	-
Short description/commentary	EU Regulation pertaining to lighting products (EC Regulation 244/2009) prescribes that by the year 2016 the manufacture of conventional incandescent lamps will cease, resulting in their replacement by energy saving lamps. Assuming that the average household in the city spent around 35 kWh of electricity in month for lighting, in 2011, for the same purposes, electricity was spent to the amount of 52 000 MWh. An average saving lamp consumes even 80% less electricity than a standard lamp, and so by 2020 this measure will have saved about 65 803 MWh.

8.2.4 Commercial and service sector in the City of Tirana

Number/Measure/activity name	22. Energy management and control in the commercial and service sector
Implementing body	- Ministry of Economy, Trade and Energy of the Republic of Albania - National Agency of Natural Resources - Scientific (academic) institutions - Private sector - NGO sector - Energy auditors
Implementation beginning/end (years)	2013-2020
Cost assessment (measure individual or total assessment) €	150 000
Energy saving assessment (MWh)	18 901 MWh of thermal energy
CO_2-emission-reduction assessment (t CO_2)	5 306,2
Funding for measure implementation	• Ministry of Economy, Trade and Energy of the Republic of Albania • International funds • Private sector • NGOs
Short description/commentary	Construction norms and standards and their successful implementation are an efficient method, which, via an official document ensures harmonisation of contractors and construction companies with the best practices and solutions. The Ministry of Economy, Trade and Energy should set a promotion/educational programme including construction with two target groups: experts and energy managers. Furthermore, the Ministry of Economy, Trade and Energy should consider the possibilities for capacity building of construction inspection. Implementing the requirements for buildings' energy efficiency on a national level, via construction norms and building certification will bring about a cumulative improvement of the subsector's efficiency. Besides, the continuous price growth of electricity will make a strong impetus for the private and the commercial sector in improving energy management and the fast acceptance of the EE construction norms.

Number/Measure/activity name	23. Improvement of Energy performances of commercial and service buildings
Implementing body	- Ministry of Economy, Trade and Energy of the Republic of Albania - Ministry of Environment and Physical Planning of the Republic of Albania - Municipal authorities - National Agency of Natural Resources - Scientific (academic) institutions - Private sector - Energy Efficiency Fund - Financial institutions - State Statistical Office of the Republic of Albania
Implementation beginning/end (years)	2014-2020
Cost assessment (measure individual or total assessment) €	1,1 M EUR
Energy saving assessment (MWh)	55 000 of thermal energy
CO_2-emission-reduction assessment (t CO_2)	15 440,4
Funding for measure implementation	• Company owners • Financial institutions • EE Fund
Short description/commentary	Commercial and service buildings are considerable consumers of all types of energy. More often than not, these buildings are steam-heated and this results in overheating, but also in significant heat losses due to the lost condensate and the overall inefficiency of the steam boiler (there are no stem heated systems). These building types basically are weakly insulated and rely much on energy supply. Along with the joint measures for energy efficiency in these facilities, such as roof insulation, fenestration, wall insulation, lighting, and the like, more attention should be paid to quality planning, construction and to the utilisation of air conditioning systems. The measure's aim is to improve the energy efficiency of commercial – service buildings by avoiding or reducing the need for heating, air conditioning, cooling and lighting, too. The target group consists of the stakeholders participating in the building construction and reconstructions in this sector. This measure basically involves the following: • Integration of passive heating and cooling in new buildings and when renovating old ones; • Utilisation of waste energy for heating/cooling; • Quality improvement of thermal insulation in new buildings; • Quality improvement of thermal insulation when renovating; • Consideration of energy efficiency aspects during construction and working time in buildings; • Energy-efficiency-related improvements in terms of building heating, air conditioning, and airing; • Efficient lighting;

	• Energy-efficient appliances and office equipment. The realisation of this measure requires the following steps: - Preparation of Regulation for low energy buildings; - Transposition of Directive 2009/125/EC for the setting of ecodesign requirements for energy-related products; - Preparation of rulebook on energy performance of appliances; - Preparation of rulebook on energy efficiency of fluorescent lamp ballast; - Mandatory energy audits in public buildings; - Technical inspection and control of implementation procedure regularity; - Establishment of the central register and energy consumption monitoring system in all municipal buildings; - Voluntary agreement for energy consumption reduction in all municipal buildings; - Increasing the number of qualified staff in public institutions for the implementation of EEMP and other energy efficiency policies, as well as related monitoring and assessment.

Number/Measure/activity name	**24. Subsidies for low-energy and passive buildings in the existing commercial and service sector in the City of Tirana**
Implementing body	- The City of Tirana
Implementation beginning/end (years)	2015- 2020
Cost assessment (measure individual or total assessment) €	Investment survey needed
Energy saving assessment (MWh)	37 802 MWh of thermal energy
CO_2-emission-reduction assessment (t CO_2)	10 612,3
Funding for measure implementation	• Budget of The City of Tirana • International funds • EE Fund
Short description/commentary	Setting conditions for stimulation measures upon improving thermal insulation in buildings of the commercial and service sector in the City of Tirana in line with the standards for passive and low-energy houses. Before measure implementation, a detailed analysis is essential to determine the status, prospect and means of implementation. Based on international experience, estimated thermal energy saving amounts to about 10% of the total thermal energy consumption in this subsector in year 2011 – 378 016 MWh. From the total energy consumption in service sector of approx. 550 000 MWh in year 2011, 378 017 MWh was consumed for heating/cooling.

Number/Measure/activity name	**25. Subsidies for the use of renewable energy sources in the existing commercial and service sector in the City of Tirana**
Implementing body	- The City of Tirana
Implementation beginning/end (years)	2015- 2020
Cost assessment (measure individual or total assessment) M€	Investment survey needed
Energy saving assessment (MWh)	30 241 MWh
CO_2-emission-reduction assessment (t CO_2)	8 489,7
Funding for measure implementation	• Budget of The City of Tirana • Sector's own funding

Short description/commentary	Setting conditions for stimulus measures upon the use of renewable energy sources in thermal energy production. Before measure implementation, a detailed analysis is essential to determine the status, prospect and means of implementation. Based on the experiences so far, thermal energy savings are estimated at 8% of the total thermal energy consumption in this subsector in 2011 – 15 121 MWh.

Number/Measure/activity name	**26. Installation of energy-saving lamps in buildings of the commercial and service sector**
Implementing body	- Market Law
Implementation beginning/end (years)	2013- 2017
Cost assessment (measure individual or total assessment) M€	No cost
Energy saving assessment (MWh)	26 644 MWh of electricity
CO_2-emission-reduction assessment (t CO_2)	7 593,5
Funding for measure implementation	Sector's own funding
Short description/commentary	EU Regulation pertaining to lighting products (EC Regulation 244/2009) prescribes that by the year 2016 the manufacture of conventional incandescent lamps will cease, resulting in their replacement by energy saving lamps. Based on previous experience, electricity savings are estimated at 15% of the total electricity consumption in this subsector in 2011. Hence, the replacement of incandescent lamps with energy-saving lamps will become mandatory throughout the commercial and service sector.

Number/Measure/activity name	**27. Adopting a decision on a 30% reduction of the communal fee by the City Council for new buildings in the commercial and service sector using renewable energy sources**
Implementing body	- The City of Tirana
Implementation beginning/end (years)	2013 -2020
Cost assessment (measure individual or total assessment) M€	No initial investment cost
Energy saving assessment (MWh)	45 364 MWh of thermal energy
CO_2-emission-reduction assessment (t CO_2)	12 735,3
Funding for measure implementation	-
Short description/commentary	Before measure implementation, a detailed analysis is essential to determine the status, prospect and means of implementation. Estimations suggest that upon implementing this measure, thermal energy consumption in this subsector should drop by 12% by the end of 2020.

8.3 Measures for CO_2 emission reduction in the transport sector of the City of Tirana

Measures for CO_2 emission reduction in the transport sector of the City of Tirana are divided into the 5 following categories:

- Legal and planned measures;
- Promotion, information and education measures and activities;
- Private and commercial vehicles;
- Vehicles owned by the City;
- Public transport.

The category of legal and planned measures includes measures and activities ensuing from legal obligations and the ones related to planning projects for transport infrastructure improvement, enhanced traffic regulation, safety improvements, etc. It should be underlined that the implementation of the foreseen measures will create the conditions needed to improve the transport sector in the City of Tirana, but determining the specific investment costs requires a separate investment survey. Most of the determined measures can be described qualitatively, whereas gaining quantitative results demands further research and analysis for the measure in question. The implementations of measures that involve capital investment costs require extensive preparatory activities in the form of feasibility studies and other crucial analyses for determining the necessary investments and other parameters.

8.3.1 Legislative and planned measures

Measure/activity name	**1. Parking policy in the City of Tirana**
Implementing body	- City of Tirana
Implementation beginning/end (years)	2013-2020
Cost assessment (measure individual or total assessment) M€	The measures will be financed through parking fees
Energy saving assessment (TJ)	It is not possible to estimate it without further analyses.
CO_2-emission-reduction assessment (t CO_2)	-
Funding for measure implementation	-
Short description/commentary	Parking policy of the City of Tirana is based on parking fees in Tirana's core area. This policy will help in changing people's behavior in terms of travel. The preposition of this measure is to extend parking area to other parts of City. High-price policy for parking, along with parking time limitation, caused current car users switching to other more efficient means of transport - public transport or a bicycle. The main goal is to discourage the use of individual cars in cities, to reduce pollution and to ensure a safer movement for pedestrians.

Number/Measure/activity name	2. EU fuel quality and economy standards
Implementing body	- Ministry of Public Works and Transport - Oil production/Oil-importing companies
Implementation beginning/end (years)	
Cost assessment (measure individual or total assessment) M€	No costs
Energy saving assessment (TJ)	-
CO_2-emission-reduction assessment (t CO_2)	-
Funding for measure implementation	• Ministry of Economy, Trade and Energy • Private sector • Donations
Short description/commentary	The Ministry of Public Works and Transport is the competent body for enforcement of EU fuel quality and fuel economy standards. This measure represents the implementation of the European standards for fuel quality and fuel economy. Measure's implementation does not entail any direct cost. The regulation of higher fuel quality should be introduced and implemented by the oil production companies and companies selling oil derivatives. The anticipated savings will result from vehicles' improved engine efficiency and the improved fuel economy. Measure's main goal is to implement the European fuel quality and fuel economy standards.

Number/Measure/activity name	3. Tax reductions for purchase of eco-friendly vehicles
Implementing body	- Ministry of Finance of the Republic of Albania - Ministry of Public Work and Transport of the Republic of Albania - NGOs - State Statistical Office of the Republic of Albania
Implementation beginning/end (years)	2013-2020
Cost assessment (measure individual or total assessment) M€	No investment costs
Energy saving assessment (TJ)	-
CO_2-emission-reduction assessment (t CO_2)	-
Funding for measure implementation	• National budget
Short description/commentary	International experience has shown that measures for reduced use of motor vehicles as a means to reduce energy consumption often proved as inefficient. Therefore, far more important is the improvement of the average fuel consumption, which can ensure considerable energy saving, or at the very least, a reduction in the rising fuel consumption. In terms of Albania, having a rather old rolling stock, this measure may prove as most significant. This measure foresees tax reductions on new, energy-efficient vehicles, as an incentive to a faster renewal of the motor vehicles. This measure is tightly connected to the measures regarding rolling stock renewal. The main goal is tax reduction on new, energy-efficient vehicles, and also providing lower cost for their registration. Before implementation of the measure, information campaigns should take place during minimally one year. The Ministry of Public Works and Transport in cooperation with NGO-s should be responsible for the information campaigns and Ministry of Finance is in charge of legislative part - preparation of the Ordinance on VAT that will define

	proportionate discounts for the registration of vehicles depending on fuel's Euro standard (Euro 6, Euro 5, Euro 4) Car sale companies should submit monthly reports on vehicle sale to the State Statistical Office of the Republic of Albania, which should be responsible for processing and publishing the Annual statistical report on the sale of new eco-friendly vehicles.

Number/Measure/activity name	**4. Energy labelling of new cars**
Implementing body	- Ministry of Public works and Transport - Ministry of Economy, Trade and Energy
Implementation beginning/end (years)	
Cost assessment (measure individual or total assessment) M€	No cost
Energy saving assessment (TJ)	3 TJ - diesel 1 TJ - gasoline
CO_2-emission-reduction assessment (t CO_2)	291,0
Funding for measure implementation	-
Short description/commentary	Adoption of the EU-wide energy labelling system for new cars with Classes A-G according to CO_2 emissions. Obligation for car importers / car dealers to present the energy label for customers. The energy label for cars will make fuel consumption more transparent and comparable for customers. Thus, the instrument motivates car buyers to give fuel consumption a high priority when deciding between different cars. Data on the energy saving assessment is taken by the NEEAP.

Number/Measure/Activity name	**5. Rolling stock renewal of road vehicles**
Implementing body	- Ministry of Public Works and Transport - Regional Directorate of Road Transport of Tirana - The City of Tirana
Implementation beginning/end (years)	2014/ 2020
Cost assessment (measure individual or total assessment) M€	Investment study needed
Energy saving assessment (TJ)	2,43 TJ diesel 2,43 TJ gasoline
CO_2-emission-reduction assessment (t CO_2)	348,0
Funding for measure implementation	• National budget • City budget • Donors
Short description/commentary	The Republic of Albania has a very old rolling stock. According to data by the State Statistical Office, the average car age in Albania is 15,5 years. A significant part of vehicles have engines that do not even meet the Euro 1 standard. Therefore, the average passenger vehicle in Albania has low fuel economy and high pollution rate. Accordingly, the Government of the Republic of Albania makes efforts to promote and, by fiscal means, accelerate the renewal of the country's rolling stock, thus increasing energy saving and reducing pollution. The target group includes citizens, private and public sector. The main goal is providing new vehicles.

	Realization stages: • Information campaign up until 2014 • Change of regulations and taxes by 2016 • Consecutive implementation by 2020.

8.3.2 Promotion, information and education measures

Name of the measure/activity	**6. Promotional, informational and educational measures and activities**
Implementing body	- City of Tirana
Beginning/ end of implementation (year)	2013- 2020
Estimated costs (unit value or total value per measure)	30 000 € per year, 210 000 € in total
Estimated savings (TJ)	128,3 TJ – gasoline 85,2 TJ - diesel
Evaluation of emissions reduction (t CO_2)	15 190,8
Source of implementation funds	• Budget of the City of Tirana • National budget • Donors
Short description/commentary	Promotional, informational and educational measures and activities with the goal of improving the quality of transport and reduction of CO_2 emissions in Tirana include: 1. Promotion of the car-sharing model for increasing the number of passengers; 2. Information and training on the ecologically acceptable ways of driving (driving schools); 3. Promotion of the use of alternative fuels; 4. Organization of information- demonstrative workshops for citizens on the use of vehicles with alternative fuels (electric energy, natural gas, bio fuel etc.) with the possibility of hiring vehicles with alternative fuels; 5. Organization of panels, workshops and roundtables, carrying out polls and research, distribution of informational and promotional materials etc; 6. Campaign: Bicycle is healthier! Drawing on the experience of developed European cities, the ongoing promotional, educational and informational activities and campaigns will result in the total savings of fuel of up to 10 % in the subsector of private and commercial vehicles in the nine-year period up until 2020.

Name of the measure/activity	7. Promotion of usage of alternative fuels
Implementing body	- City of Tirana
Beginning/ end of implementation (year)	2013- 2020
Estimated costs (unit value or total value per measure)	Increasing the general level of knowledge of citizens on the vehicles with alternative fuels through the media € 50 000 per year. Organization of courses and presentations € 25 000. Subventions for buying new ecologically acceptable vehicles amount to 10% of the vehicle gross price.
Estimated savings (TJ)	There are no direct savings of fuel. However, the increase of the use of ecological fuels will contribute to the CO_2 emissions reduction.
Evaluation of emissions reduction (t CO_2)	
Costs per emission reduction(€/t CO_2)	-
Source of implementation funds	• EU Structural funds • Regional funds (EIB, KfW) • GIZ, UNDP, USAID
Short description/commentary	Increasing the general level of knowledge of citizens on the vehicles fuelled by alternative fuels, through different promotional activities and trainings demonstrating the operation of such vehicles. Stimulation of introducing vehicles fuelled by alternative fuels, in taxi services by means of subventions when buying new vehicles.

Number/Measure/activity name	8. Information campaign on energy efficient driving behavior (eco-driving)
Implementing body	- Ministry of Public Works and Transport - Regional Directorate of Road Transport of Tirana
Implementation beginning/end (years)	2014 - 2020
Cost assessment (measure individual or total assessment) M€	40 000
Energy saving assessment (TJ)	0,75 – TJ diesel 0,25 -TJ gasoline
CO_2-emission-reduction assessment (t CO_2)	72,8
Funding for measure implementation	
Short description/commentary	The elements of energy efficient driving behavior will be included into the curricula of driving schools; for experienced drivers, subsidized courses will be held, either in real cars or with a simulator; information material on efficient driving style and the above mentioned courses will be distributed to all car holders. Besides a more relaxing driving and greater security, the consequent application of eco-driving principles can lead to fuel savings of up to 10 per cent. However, for long lasting change of the driving behavior, mere information material is not sufficient; one-afternoon-eco-driving courses for experienced drivers showed a much larger impact on driving behavior. Data on the energy saving assessment is taken by the NEEAP.

Name of the measure/activity	9. Campaign:"One Day a Week without a Car"
Implementing body	- City of Tirana - Ministry of Public Works and Transport - Regional Directorate of Road Transport of Tirana
Implementation beginning/end (years)	2013- 2020
Cost assessment (measure individual or total assessment) M€	€20 000 for the promotion of the campaign
Energy saving assessment (TJ)	25,7 TJ – gasoline 17,0 TJ - diesel
CO_2-emission-reduction assessment (t CO_2)	3 038,0
Funding for measure implementation	• Budget of the City • Regional funds (EIB, KfW) • GIZ, UNDP, USAID
Short description/commentary	The campaign "One day a week without car" encourages drivers to leave their cars at home for one day in a week, and in return they receive a cheaper public transport ticket, a discount on cultural and sports events, discount in the stores and shopping malls. It is estimated that the continual campaign would result in reductions of fuel consumption in the subsector of private and commercial vehicles by 2 % by 2020.

8.3.3 Vehicles owned/used by the City of Tirana

Number/Measure/activity name	10. Green Public Procurement for vehicles owned by the City of Tirana
Implementing body	- The City of Tirana
Implementation beginning/end (years)	2014- 2020
Cost assessment (measure individual or total assessment) M€	No investment cost
Energy saving assessment (TJ)	Fuel consumption will be insignificantly reduced, but the emission of greenhouse gas will decrease significantly.
CO_2-emission-reduction assessment (t CO_2)	82,5
Funding for measure implementation	• The City of Tirana
Short description/commentary	The initial step to the measure implementation is the adoption of the Decision on Green Public Procurement criteria for vehicles owned by the City on behalf of the City Council. The Green Public Procurement for all City owned vehicles should request on the sole purchase of low CO_2 emission vehicles (<120 g/km) or alternative fuel vehicles.

8.3.4 Public transport

Measure/activity name	11. Introduction of tram public transport in Tirana
Implementing body	- The City of Tirana - Regional Directorate of Road Transport of Tirana - New tram management company
Implementation beginning/end (years)	2015 - 2020
Cost assessment (measure individual or total assessment) €	Approximately, 7 000 000, but it is a capital investment that requires detailed investment study
Energy saving assessment (TJ)	76,2 TJ – gasoline 54,9 TJ - diesel
CO_2-emission-reduction assessment (t CO_2)	9 339,7
Funding for measure implementation	• Budget of the City of Tirana • State budget of the Republic of Albania • International financial institutions • Donors
Short description/commentary	Experience from other countries in the world shows that urban rail system is more attractive than the bus transport. The main reason is the higher level of service (faster, more reliable, greater capacity) and the lower emission offered by this type of transport. It may even attract some of the regular car users. The effects arising from the introduction of tram to Tirana may be significant if combined with other means to discourage the use of individual motor vehicles like parking policies (expensive and limited parking time), pedestrian and other zones of limited access to motor vehicles, etc. This will result in energy saving due to the decreased use of private cars as a means of urban transport. The Spatial plan of the City of Tirana plans introduction of tram public transport through 4 tram lines (north-south line, south–north line, east-west line and west-east line). It is important to mention that the tram lines will bring out of operation at least two bus lines, Kinostudio – Kombinat and Stacioni I Trenit.

Name of the measure/activity	12. Set of measures for improving public bus transport in the City of Tirana
Implementing body	- The City of Tirana - Regional Directorate of Road Transport of Tirana - New tram management company
Beginning/end of implementation (year)	2013- 2020
Cost assessment (measure individual or total assessment) €	Each measure requires the development of an investment study.
Energy saving assessment (TJ)	96,2 TJ – gasoline 63,9 TJ - diesel
CO_2-emission-reduction assessment (t CO_2)	11 391,4
Funding for measure implementation	• Budget of the City • Regional funds (EIB,KfW) • Credits (EBRD, commercial banks)
Short description/commentary	Measures for improvement of the quality of public bus transport in the City: a. Installation of LED displays for signalizing the arrival of buses on all bus stops in Tirana; b. The building of public parking lots for buses;

	c. Replacement of standard buses with minibuses in the evenings, along the bus lines with smaller number of passengers; d. Settlement of bus stops and eaves; The implementation of the set of measures for improvement of public bus transport in Tirana, will not influence the reduction of CO_2 emissions directly, but indirectly through the lesser use of personal vehicles. It is estimated that due to the improvement of public bus transport, cca 30 % of citizens will use their cars less, and thus the yearly consumption will be reduced by 7,5%.

Name of the measure/activity	**13. Set of measures for improving bicycle transport in Tirana**
Implementing body	- City of Tirana - Regional Directorate of Road Transport of Tirana
Beginning/ end of implementation (year)	2013-2020
Cost assessment (measure individual or total assessment) €	The estimate of costs for this complex measure requires detailed analysis and development of feasibility study.
Energy saving assessment (TJ)	57,7 TJ – gasoline 38,3 TJ - diesel
CO_2-emission-reduction assessment (t CO_2)	6 830,5
Funding for measure implementation	• City budget • Credits (EBRD, commercial banks) • IEE for preparatory works • EU funds
Short description/commentary	Set of measures for improvement of bicycle transport in Tirana includes the following activities: • Setting up of a network of bicycles for renting, equipped with IT stealing protection, provided with bicycle sheds and repair shops and mileage meters; • Settlement and continual maintenance of bicycle tracks in the entire area of the City of Tirana The implementation of the measure includes: • Settlement and marking of bicycle tracks; • Putting up hoardings with marked bicycle maps; • Reducing the number of potential bicycle accidents by separating bicycle tracks from traffic roads wherever possible; • The putting up of a bicycle shed equipped with video surveillance for prevention of stealing, in the proximity of the railway station or at some other suitable location; • Provision of repairs and securing the keeping of private bicycles in the shed; • The purchase of bicycles for renting, taking into account that the

	bicycles should be equipped with stealing protection; • Promotion and encouragement of riding bicycles especially on short distances; • Continual maintenance of bicycle tracks in the entire Tirana area; • Promotion of programs and education on the advantages of bicycle transport in kinder gardens, schools, panels for citizens. Based on foreign experiences, this set of measures would contribute indirectly to the reduction of fuel consumption in private and commercial vehicles by 4,5 %.

8.3.5 Private and commercial vehicles

Name of the measure/activity	**14. Introduction of the *car-sharing* model for increasing the number of passengers**
Implementing body	- City of Tirana
Beginning/ end of implementation (year)	2014- 2020
Cost assessment (measure individual or total assessment) €	This is a very complex measure, the evaluation of which requires additional analysis and development of a feasibility study. Investment costs should include the construction of a parking lot (or possibly a garage), the introduction of a car-sharing model, procurement of vehicles and promotion.
Energy saving assessment (TJ)	64,1 TJ – Gasoline 42,6 TJ - Diesel
CO_2-emission-reduction assessment (t CO_2)	7 591,9
Funding for measure implementation	• Budget of the City • Credits (EBRD, commercial banks) • EU funds • Regional funds
Short description/commentary	There are more than 333 000 car-sharing vehicles in over 800 cities worldwide. Based on those experiences, it becomes evident that one car-sharing vehicle replaces 5-8 personal vehicles. Car-sharing represents rational use of private vehicles and saves money for persons who do not need personal vehicles (do not have to buy a car, pay all dues and insurance, maintenance…) Necessary activities: • Promotion of car-sharing system as a simple, accessible service with a minimal number of application forms, which requires only the payment for time and mileage (actual use of vehicle), where registered users can ride in the vehicle 24 hours a day simply by registering beforehand by telephone, internet or on the spot. • Introduction of the car sharing system brings additional revenues to the City, either by organization and offer of vehicles in the car sharing system, or by giving concessions to interested entrepreneurs. It was estimated that the establishment of this system would reduce the number of registered vehicles and thus reduce the consumption of fuel by 5% by 2020.

8.4 Measures for CO_2 emission reduction in the public-lighting sector of the City of Tirana

Name of the measure/activity	**1. Replacement of out-dated lighting fixtures with more energy efficient and ecologically-friendly lighting fixtures and street lighting control and management system**
Implementing body	- City of Tirana
Beginning/ end of implementation (year)	2013- 2020
Cost assessment (measure individual or total assessment) €	€250/ per lighting fixture Total value for 12 000 lighting fixtures: 3 000 000 EUR
Energy saving assessment (TJ)	92,75 kWh/ lighting fixtures Total: 1 113 MWh of electricity
CO_2-emission-reduction assessment (t CO_2)	317,2
Funding for measure implementation	• Budget of the City • GIZ, UNDP, USAID
Short description/commentary	Activities which need to be implemented include gradual replacement of 12 000 out-dated lighting fixtures with modern lighting fixtures with the following characteristics: • Energy efficiency; • Optical technology enables the installation of light bulbs which consume less power while retaining the same level of lighting; • Contain electronic regulation of lighting for each lighting fixture. Modern lighting fixtures should contain ignitors and electronic regulation, whereby each lamp has its own lighting regime in accordance with the lighting intensity requirements per each public space.

9 Estimation of CO_2 emission reduction for identified measures by 2020

For the estimation of the CO_2 emissions reduction for identified energy efficiency measures in the building, transport and public lighting sectors in the City of Tirana listed in the previous chapter the estimates on the trends of energy consumption and emissions by 2020 are developed for two scenarios:

- ***Scenario without measures*** *(Business as Usual Scenario- BAU)* is the main scenario, which shows the increase in energy consumption being left to market trends and costumers' habits, without the systematic implementation of energy efficiency measures, but on the assumption that new technologically advanced products will appear on the market in the course of time.

- ***Scenario with measures*** foresees the reduction of energy consumption and the corresponding CO_2 emissions by 2020, through the implementation of identified energy efficiency measures in the sector of building, transport and public lighting.

The forecasts of energy consumption and emissions for the period until 2020 was made by using the software package LEAP (*Long range Energy Alternatives Planning System*), developed by the Stockholm Environment Institute, which represents a highly developed tool for energy strategies and plans with a focus on reducing emissions of greenhouse gases. According to data from the United Nations, more than 85 countries around the world have chosen the LEAP methodology for the reporting to the UN Framework Convention on Climate Change.

9.1 Estimations of CO_2 emissions in the transport sector

In 2011, the number of inhabitants per private vehicle in the City of Tirana amounted to 4,2 inhabitants per private vehicle. The average level of EU countries in 2008 amounted to 2,1 inhabitants per private vehicle.

As already mentioned, the fuel consumption and CO_2 emissions of certain types of vehicles for scenario without measures were calculated by the LEAP model (Table 9.1). The projection of the fleet owned by the City was estimated assuming that the share of emissions from this sector is equal to the share in year 2011.

Table 9.1 Estimates of energy consumption and emissions in 2020 for the scenario without measures

Estimations of transport sector BAU Scenario	**Energy consumption**		**Emission**
	TJ	**MWh**	**t CO_2**
Private and commercial transport			
gasoline	1 527,44	424 287,89	105 902,34
diesel	1 014,17	281 712,67	74 935,63
LPG	31,36	8 712,00	1 979,02
TOTAL	**2 572,97**	**714 712,56**	**182 816,99**
Municipal fleet			
gasoline	2,99	829,69	207,09
diesel	13,82	3 837,75	1 020,84
TOTAL	**16,81**	**4 667,44**	**1 227,93**

Public transport			
diesel	291,01	80 837,36	22 502,76
gasoline	26,53	7 368,08	1 839,08
TOTAL	317,54	88 205,44	24 341,84
TOTAL TRANSPORT SECTOR	**2 907,32**	**807 585,44**	**208 386,76**

The development of scenario with the measures is based on the estimates of reduction of energy consumption in 2020 according to the measures listed in the previous chapter. Measures are divided per subsectors showing savings and potentials of CO_2 reduction per each measure (table 9.2).
Figure 9.1 shows the contribution of each subsector to the overall potential emission reduction in the transport sector.

Table 9.2 Savings and potentials of CO_2 reduction per each measure

MEASURES AND POTENTIAL OF CO_2 EMISSION REDUCTION IN TRANSPORT SECTOR	Estimate of energy savings		Estimate of emission reduction	
	Gasoline	Diesel	Gasoline	Diesel
	TJ	TJ	t CO_2	t CO_2
Legislative and planned measures				
Energy labelling of new cars	1,00	3,00	69,33	221,67
Rolling stock renewal of road vehicles	2,43	2,43	168,48	179,55
TOTAL	**3,43**	**5,43**	**237,81**	**401,22**
Promotion, information and education measures				
Promotional, informational and educational measures and activities	128,30	85,20	8 895,47	6 295,34
Information campaign on energy efficient driving behaviour (eco-driving)	0,25	0,75	17,33	55,42
Campaign: ”One Day a Week without a Car”	25,70	17,00	1 781,87	1 256,11
TOTAL	**154,25**	**102,95**	**10 694,68**	**7 606,87**
Municipal fleet				
Green Public Procurement for vehicles owned by the City of Tirana	0,00	0,00	13,90	68,60
TOTAL	**0,00**	**0,00**	**13,90**	**68,60**
Private and commercial transport				
Introduction of the car-sharing model for increasing the number of passengers	64,10	42,60	4 444,27	3 147,67
TOTAL	**64,10**	**42,60**	**4 444,27**	**3 147,67**
Public transport				
Introduction of tram public transport in Tirana	76,20	54,90	5 283,20	4 056,50
Set of measures for improving public bus transport in the City of Tirana	96,20	63,90	6 669,87	4 721,50
Set of measures for improving bicycle transport in Tirana	57,70	38,30	4 000,54	2 829,95
TOTAL	**230,10**	**157,10**	**15 953,61**	**11 607,95**
TOTAL TRANSPORT SECTOR	**451,88**	**308,08**	**31 344,27**	**22 832,31**
	759,96		**54 176,58**	

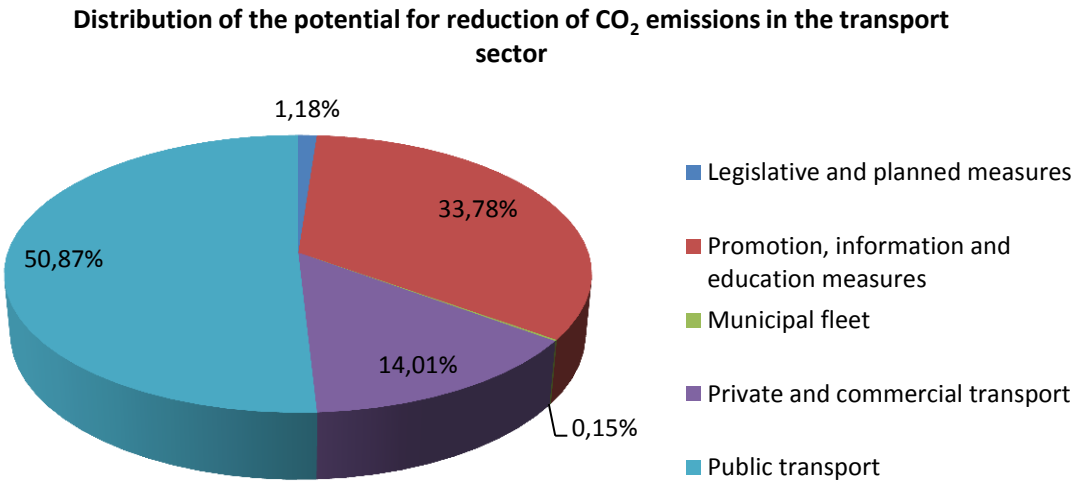

Figure 9.1 Distribution of the potential for reduction of CO_2 emissions in the transport sector

Total potential for reduction of emissions in the transport sector amounts to 54 176,58 tCO_2. Legal and planned measures, as well as promotional and educational activities and national legislation mostly relate to the sector of personal and commercial vehicles and their share will be added to the sector of private and commercial vehicles. Thus, the subsector of personal and commercial vehicles contributes to the overall reduction potential to the amount of 48,97 %, or 26 532,51 tCO_2, the share of public transport amounts to 50,87 % or 27 561,57 tCO_2 while the remaining 82,50 tCO_2 goes to the sector of vehicles owned by the City.

Scenario with measures was developed taking into account the measures given in the table 9.2, whereby the emissions of the scenario with measures was calculated as a balance of the emissions of the scenario without measures and the potential for reduction. Table 9.3 shows the consumption of energy and emissions of the scenario with measures for the transport sector.

Table 9.3 Estimates of energy consumption and emissions in 2020 for the scenario with measures

Estimations of transport sector Scenario with measures	**Energy consumption TJ**	**Emission t CO_2**
Private and commercial transport		
gasoline	1 075,56	74 571,97
diesel	706,09	52 171,92
LPG	31,36	1 979,02
TOTAL	1 813,01	128 722,91
Municipal fleet		
gasoline	2,22	193,19
diesel	11,82	952,24
TOTAL	14,04	1 145,43
Public transport		
diesel	252,01	21 502,76
electrical energy	23,53	1 839,08
TOTAL	275,54	23 341,84
TOTAL TRANSPORT SECTOR	**2 102,59**	**153 210,18**

Comparing the emissions of the scenario with measures with the emissions from 2011, it becomes evident that it is lower by 12,07%. The comparison between both scenarios and the emissions in 2011, showing total emissions and energy consumption of both scenarios, is given in the table 9.4 and figure 9.2.

Table 9.4 Estimates for the transport sector per scenarios

Energy consumption, TJ		% Compared to 2011	CO_2 emission, t		% Compared to 2011
2011	2020		2011	2020	
2 442,67	2 907,31	19,02	174 246,42	208 386,76	19,02
2 442,67	2 147,36	-12,09	174 246,42	153 210,18	-12,07

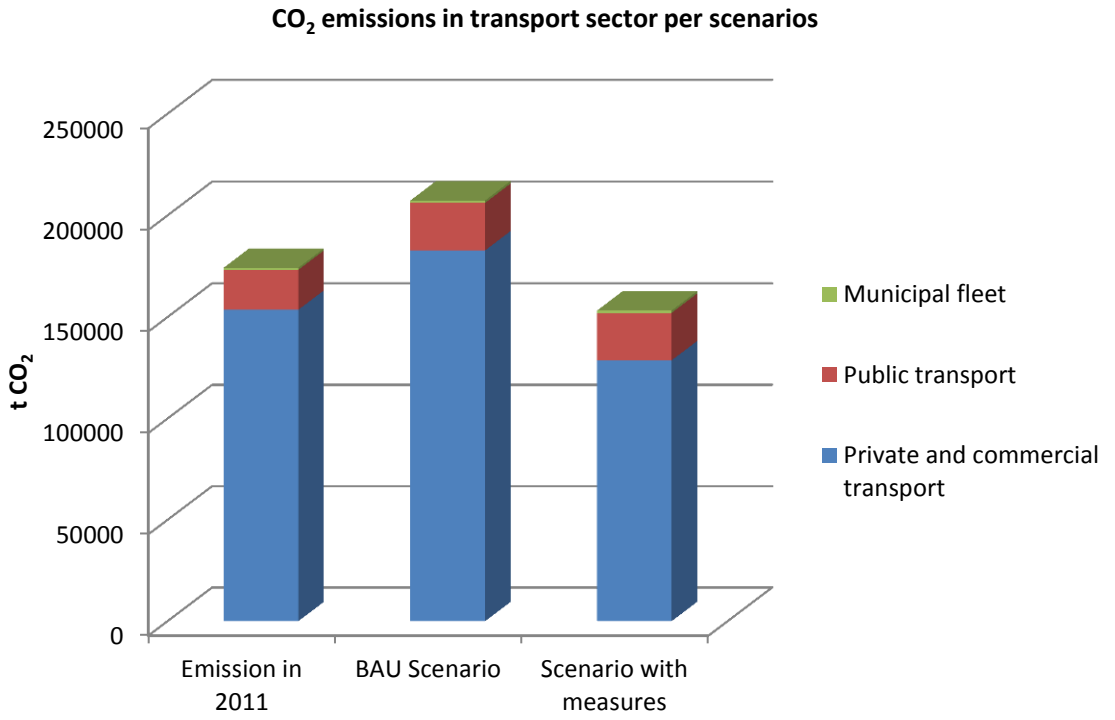

Figure 9.2 Comparison between the estimated emissions and the emissions in 2011 in the transport sector

9.2 Estimated CO_2 emissions in the building sector

Through known energy consumption in year 2011 and expected increase in consumption by year 2020 the scenario without measures for the building sector was developed. Projections of energy consumption and related emissions are presented in tables 9.5 and 9.6.

Table 9.5 Energy consumption in the building sector according to the scenario without measures

BAU Scenario	Energy consumption (MWh), 2020				
	Electrical energy	Diesel	Fuel oil	Fuel wood	LPG
MUNICIPAL BUILDINGS	16 355	5 010	-	-	-
COMMERCIAL AND SERVICE BUILDINGS	563 192	-	37 365	2 600	13 610
RESIDENTIAL BUILDINGS	948 750	39 628	-	40 935	204 830
TOTAL	**1 528 297**	**44 638**	**37 365**	**43 535**	**218 441**

Table 9.6 Estimated CO_2 emissions in the building sector according to the scenario without measures

BAU Scenario	CO_2 Emission (t), 2020				
	Electrical energy	Diesel	Fuel oil	Fuel wood	LPG
MUNICIPAL BUILDINGS	4 661	1 333	-	-	-
COMMERCIAL AND SERVICE BUILDINGS	160 510	-	10 387	0	3 092
RESIDENTIAL BUILDINGS	270 394	10 541	-	0	46 529
TOTAL	**435 565**	**11 874**	**10 387**	**0**	**49 621**

In order to develop the scenario with measures it was necessary to determine energy savings which can be achieved by 2020, by implementation of measures listed in the previous chapter. Measures are divided per sectors and each measure has a calculated list of savings and potential CO_2 emissions reduction (tables 9.7 and 9.8). Figure 9.3 shows the contribution of each subsector to the overall potential for emission reduction in the building sector.

Table 9.7 Estimated energy savings in the building sector in relation to the BAU scenario

SECTOR	Measures	Estimate of energy savings, MWh						
		Electrical energy	Thermal energy, total	Diesel	Fuel oil	Electrical energy - for heating	Fuel wood	LPG
GENERAL MEASURES	Minimum requirements on thermal quality of newly and existing buildings	0,00	52000,00	1144,00	2288,00	40456,00	1352,00	6760,00
	Certification scheme for buildings	0,00	13956,00	307,03	614,06	10857,77	362,86	1814,28
	TOTAL	**0,00**	**65956,00**	**1451,03**	**2902,06**	**51313,77**	**1714,86**	**8574,28**
MUNICIPAL BUILDINGS	Installation of solar collectors for hot water preparation in buildings owned by the City of Tirana	0,00	865,00	286,19		578,81		
	Modernisation of the lighting system in 600 classrooms in educational institutions owned by the City of Tirana	104,40	0,00	0,00		0,00		
	Installation of thermometers in every room of the buildings owned by the City of Tirana	0,00	288,00	95,29		192,71		
	Thermal insulation of facades and roofs of 100 buildings owned by the City of Tirana	0,00	4000,00	1323,41		2676,59		
	Installation of high-performance, energy- efficient windows in 100 buildings owned by the City of Tirana	0,00	1750,00	578,99		1171,01		
	Installation of thermostat sets on radiators in all buildings owned by the City of Tirana	0,00	80,00	26,47		53,53		
	Introduction of Green Public Procurement criteria for energy appliances in buildings owned by the City of Tirana	889,00	0,00	0,00		0,00		
	Installation of energy-saving lamps in buildings owned by the City of Tirana	356,00	0,00	0,00		0,00		
	Education and change of the behaviour of employees/users of buildings owned by the City of Tirana	296,00	721,00	238,55		482,45		
	TOTAL	**1645,40**	**7704,00**	**2548,90**	**0,00**	**5155,10**	**0,00**	**0,00**
RESIDENTIAL BUILDINGS	Social housing project	0,00	2300,00	101,04		1572,34	104,37	522,25
	Subsidy scheme for comprehensive refurbishment of Multi Family Houses (MFH)	0,00	49565,00	2177,37		33884,01	2249,19	11254,43
	Transposition to practice the new legal framework for condominium houses	0,00	24828,00	1090,68		16973,11	1126,66	5637,55
	Subsidy sheme for installation of solar collectors in 1000 existing residential buildings	0,00	2600,00	114,22		1777,43	117,98	590,37

	Regulation for mandatory solar collectors in new residential buildings	0,00	40000,00	1757,18		27345,11	1815,14	9082,56
	Installation of energy saving lamps in all households in the City of Tirana	65803,00	0,00	0,00		0,00	0,00	0,00
	Education and promotion of energy efficiency for the citizens of Tirana	38582,00	96449,00	4236,96		65935,22	4376,72	21900,10
	TOTAL	**104385,00**	**215742,00**	**9477,45**	**0,00**	**147487,23**	**9790,07**	**48987,25**
COMMERCIAL AND SERVICE BUILDINGS	Energy management and control in the commercial and service sector	0,00	18901,00		1683,12	16487,69	117,10	613,08
	Improvement of Energy performances of commercial and service buildings	0,00	55000,00		4897,72	47977,52	340,75	1784,01
	Subsidies for low-energy and passive buildings in the existing commercial and service sector in the City of Tirana	0,00	37802,00		3366,25	32975,38	234,20	1226,17
	Subsidies for the use of renewable energy sources in the existing commercial and service sector in the City	0,00	30241,00		2692,94	26379,78	187,36	980,91
	Installation of energy-saving lamps in buildings of the commercial and service sector	26644,00	0,00		0,00	0,00	0,00	0,00
	Adopting a decision on a 30% reduction of the communal fee by the City Council for new buildings in the commercial and service sector using renewable energy sources	0,00	45364,00		4039,64	39571,85	281,05	1471,45
	TOTAL	**26644,00**	**187308,00**	**0,00**	**16679,68**	**163392,23**	**1160,48**	**6075,63**
TOTAL BUILDINGS SECTOR		**132674,40**	**476710,00**	**13477,38**	**19581,74**	**367348,33**	**12665,40**	**63637,16**

Table 9.8 Potential CO_2 emissions reduction in the building sector

Sector	Measures	Estimate of CO_2 emission reduction, (t)						
		Electrical energy	**Thermal energy, total**	**Diesel**	**Fuel oil**	**Electrical energy- for heating**	**Fuel wood**	**LPG**
GENERAL MEASURES	Minimum requirements on thermal quality of newly and existing buildings	0,00	14005,93	304,30	636,06	11529,96	0,00	1535,60
	Certification scheme for buildings	0,00	3758,98	81,67	170,71	3094,46	**0,00**	412,13
	TOTAL	**0,00**	**17764,91**	**385,97**	**806,77**	**14624,42**	**0,00**	**1947,73**
MUNICIPAL BUILDINGS	Installation of solar collectors for hot water preparation in buildings owned by the City of Tirana	0,00	241,09	76,13		164,96		
	Modernisation of the lighting system in 600 classrooms in educational institutions owned by the City of Tirana	29,75	0,00	0,00		0,00		
	Installation of thermometers in every room of the buildings owned by the City of Tirana	0,00	80,27	25,35		54,92		
	Thermal insulation of facades and roofs of 100 buildings owned by the City of Tirana	0,00	1114,86	352,03		762,83		
	Installation of high-performance, energy- efficient windows in 100 buildings owned by the City of Tirana	0,00	487,75	154,01		333,74		
	Installation of thermostat sets on radiators in all buildings owned by the City of Tirana	0,00	22,30	7,04		15,26		
	Introduction of Green Public Procurement criteria for energy appliances in buildings owned by the City of Tirana	253,37	0,00	0,00		0,00		
	Installation of energy-saving lamps in buildings owned by the City of Tirana	101,46	0,00	0,00		0,00		
	Education and change of the behaviour of employees/users of buildings owned by the City of Tirana	84,36	200,95	63,45		137,50		
	TOTAL	**468,94**	**2147,21**	**678,01**	**0,00**	**1469,20**	**0,00**	**0,00**
RESIDENTIAL BUILDINGS	Social housing project	0,00	593,63	26,88		448,12	0,00	118,63
	Subsidy scheme for comprehensive refurbishment of Multi Family Houses (MFH)	0,00	12792,68	579,18		9656,94	0,00	2556,56
	Transposition to practice the new legal framework for condominium houses	0,00	6408,08	290,12		4837,34	0,00	1280,62
	Subsidy sheme for installation of solar collectors in 1000 existing residential buildings	0,00	671,06	30,38		506,57	0,00	134,11

	Regulation for mandatory solar collectors in new residential buildings	0,00	10323,96	467,41		7793,36	0,00	2063,19
	Installation of energy saving lamps in all households in the City of Tirana	18753,86	0,00	0,00		0,00	0,00	0,00
	Education and promotion of energy efficiency for the citizens of Tirana	10995,87	24893,40	1127,03		18791,54	0,00	4974,83
	TOTAL	**29749,73**	**55682,81**	**2521,00**	**0,00**	**42033,86**	**0,00**	**11127,94**
COMMERCIAL AND SERVICE BUILDINGS	Energy management and control in the commercial and service sector	0,00	5306,17		467,91	4698,99	0,00	139,27
	Improvement of Energy performances of commercial and service buildings	0,00	15440,41		1361,57	13673,59	0,00	405,26
	Subsidies for low-energy and passive buildings in the existing commercial and service sector in the City of Tirana	0,00	10612,34		935,82	9397,98	0,00	278,54
	Subsidies for the use of renewable energy sources in the existing commercial and service sector in the City	0,00	8489,70		748,64	7518,24	0,00	222,82
	Installation of energy-saving lamps in buildings of the commercial and service sector	7593,54	0,00		0,00	0,00	0,00	0,00
	Adopting a decision on a 30% reduction of the communal fee by the City Council for new buildings in the commercial and service sector using renewable energy sources	0,00	12735,25		1123,02	11277,98	0,00	334,25
	TOTAL	**7593,54**	**52583,87**	**0,00**	**4636,95**	**46566,78**	**0,00**	**1380,14**
TOTAL BUILDINGS SECTOR		**37812,20**	**128178,80**	**3584,98**	**5443,72**	**104694,27**	**0,00**	**14455,82**

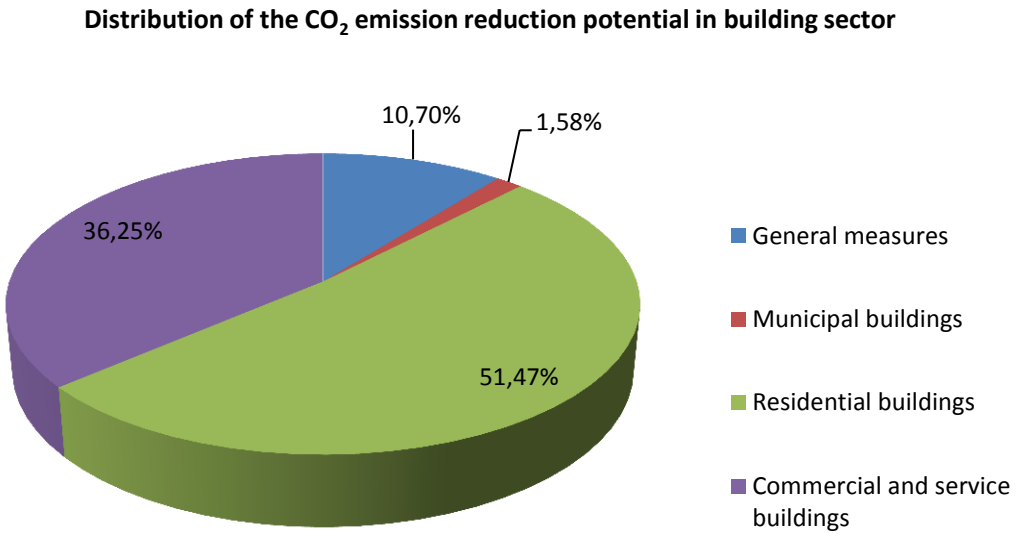

Figure 9.3 Distribution of the potential for CO_2 emissions reduction in the building sector of the City of Tirana

Total potential for reduction of emissions in the building sector amounts to 165 991,00 tCO_2. The share of the housing sector amounts to 51,47% or 85 432,53 tCO_2. The general measures contribute with 10,70% or 17 764,91 tCO_2. Commercial and service buildings contribute with 36,25% or 60 177,41 tCO_2, while the remaining 1,58 % or 2 616,15 tCO_2 goes to the buildings owned by the City.

Scenario with measures was created taking into account the measures given in the tables 9.7 and 9.8. The emissions in the Scenario with measures were calculated as a balance of the emissions in the scenario without measures and the potential for reduction. Table 9.9 shows the consumption of energy and the table 9.10 shows the emissions of the scenario with measures.

Table 9.9 Energy consumption in the building sector according to the scenario with measures

Scenario with measures	Energy consumption (MWh), 2020				
	Electrical energy	Diesel	Fuel oil	Fuel wood	LPG
MUNICIPAL BUILDINGS	9 554,37	2 461,34	-	-	-
COMMERCIAL AND SERVICE BILDINGS	347 498,69	-	17 783,29	581,74	3 247,56
RESIDENTIAL BUILDINGS	671 221,25	28 699,54	-	30 287,67	151 555,79
TOTAL	**102 8274,31**	**31 160,88**	**17 783,29**	**30 869,41**	**154 803,35**

Table 9.10 Estimated CO_2 emissions in the building sector according to the scenario with measures

Scenario with measures	CO_2 emission reduction (t), 2020				
	Electrical energy	Diesel	Fuel oil	Fuel wood	LPG
MUNICIPAL BUILDINGS	2 722,99	654,71	-	-	-
COMMERCIAL AND SERVICE BUILDINGS	99 037,12	-	4 943,46	0,00	737,72
RESIDENTIAL BUILDINGS	191 298,06	7 634,08	-	0,00	34 427,45
TOTAL	**293 058,17**	**8 288,80**	**4 943,46**	**0,00**	**35 165,17**

Tables 9.9 and 9.10 give the savings and potential reductions per each measure. Comparing the emissions in the scenario with measures to the emissions in 2011, it becomes evident that it is lower by 26,23% in relation to the emissions from 2011. The comparison between both scenarios and the emissions from 2011, showing total emissions and energy consumption of both scenarios, is given in table 9.11 and figure 9.4.

Table 9.11 Estimates for the building sector according to scenarios

Scenario	Energy consumption, MWh		% compared to 2011	CO_2 emission, t		% compared to 2011
	2011	2020		2011	2020	
BAU Scenario	1 708 235,45	1 872 275,65	9,60	462 881,07	507 446,61	9,63
Scenario with measures	1 708 235,45	1 262 891,25	-26,07	462 881,07	341 455,60	-26,23

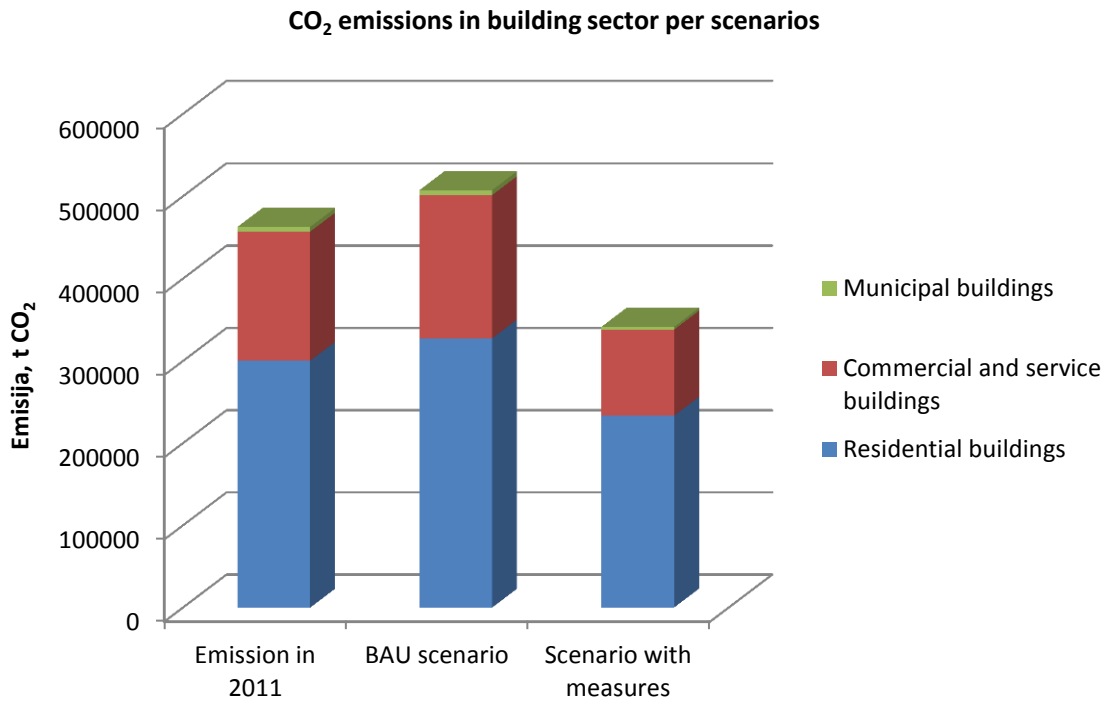

Figure 9.4 Comparison of estimated emissions in the building sector with the emissions from 2011

9.3 Estimated CO_2 emissions in the sector of public lighting

Through known electricity consumption in the sector of public lighting in the City of Tirana in year 2011 and expected increase in consumption by 2020 the scenario without measures was developed. Projections of electricity consumption by 2020 and related emissions are presented in table 9.12.

Table 9.12 Consumption of electricity and CO_2 emissions in the public lighting sector according to the scenario without measures

Public lighting	Energy consumption in 2011, MWh	Increase in electricity consumption in MWh in 2020	BAU Scenario, 2020	
			Energy consumption, MWh	CO_2 emission, t
Electrical energy	6 895,02	1 379,01	8 274,03	2 358,10

Scenario with measures includes two measures, of which the potential for energy savings and the corresponding CO_2 emissions are given in the table 9.13.

Table 9.13 List of measures and corresponding savings and potential for CO_2 emissions reduction in the public lighting sector

Name of measure	**Estimate of energy savings, MWh**	**Estimate of CO_2 emission reduction, t**
Replacement of out-dated lighting fixtures with more energy efficient and ecologically-friendly lighting fixtures and street lighting control and management system	1 113,00	317,21
TOTAL	**1 113,00**	**317,21**

Total potential for CO_2 emission reduction in the public lighting sector of the City of Tirana by 2020 amounts to 317,21 tCO_2.
The comparison between the CO_2 emissions from the scenario with measures and emissions from 2011, shows that it is higher by 3,86% compared to 2011, but still significantly lower than the BAU emissions scenario. The comparison between both scenarios and the emissions from 2011, is given in table 9.14.

Table 9.14 Estimates for the public lighting sector according to scenarios

Scenario	**Energy consumption, MWh**		**% compared to 2011**	**Emission, t CO_2**		**% compared to 2011**
	2011	**2020**		**2011**	**2020**	
BAU Scenario	6 895,02	8 274,03	20,00	1 965,08	2 358,10	20,00
Scenario with measures	6 895,02	7 161,03	3,86	1 965,08	2 040,90	3,86

9.4 Total estimations of CO_2 emissions of the Baseline Emissions Inventory of the City of Tirana

Estimations of CO_2 emissions were developed for all three sectors of final energy consumption in the City of Tirana: transport, building and public lighting. The same emission factors used for determining the Baseline Emissions Inventory were used for calculating the estimations, even though the factors for determining indirect CO_2 emissions vary from one year to the next, depending on the way of production of electricity and thermal energy.

The survey of total Inventory emissions per sectors is given in the table 9.15 for both scenarios. The building sector has the greatest share in total emissions of both scenarios. The share of the building sector in total emissions of the scenario without measures amounts to 70,75% , while its share in the scenario with measures amounts to 68,74%. The share of the transport sector in the emissions of the scenario without measures amounts to 28,92%, while its share in the scenario with measures amounts to 30,85%. The stated data shows that the building sector has the greatest potential for CO_2 emissions reduction (table 9.15 and figure 9.5). In the scenario with measures, the emissions in the building sector are lower by 26,23% in relation to year 2011. Emissions in the transport sector are lower by 12,07%. Total inventory reduction in relation to the base year amounts to 22,28%.

Table 9.15 Estimations of Inventory emissions according to the scenario with measures and the scenario without measures

Scenario	Sector	Emission, t CO_2		% compared to 2011
		2011	2020	
BAU Scenario	Transport	174 246,42	207 386,76	19,02
	Buildings	462 881,07	507 446,61	9,63
	Public lighting	1 965,08	2 358,10	20,00
	TOTAL	**639 092,57**	**717 191,47**	**12,22**
Scenario with measures	Transport	174 246,42	153 210,18	-12,07
	Buildings	462 881,07	341 455,60	-26,23
	Public lighting	1 965,08	2 040,90	3,86
	TOTAL	**639 092,57**	**496 706,67**	**-22,28**

Total emissions according to the scenario without measures amount 717 191,47 tCO_2, which represents an increase of 12,22% in relation to 2011. Total potential for emission reduction by 2020 per sectors is given in the table 9.16.

Table 9.16 Total potential for emission reduction per sectors

Sector	Emission reduction potential, t CO_2	Share in the total potential, %
Transport	54 176,58	24,57
Buildings	165 991,00	75,28
Public lighting	317,21	0,14
TOTAL	**220 484,79**	**100,00**

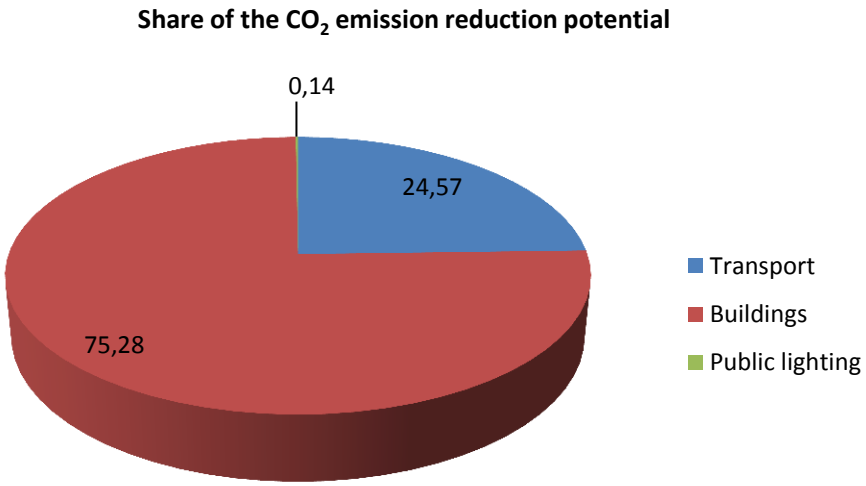

Figure 9.5 Distribution of potential reduction of CO_2 (%) emissions Inventory per sectors

Total potential for emission reduction in 2020 for the City of Tirana amounts to 220 484,79 tCO_2. The building sector has the greatest potential for emissions reduction amounting to 165 991,00 tCO_2, which equals the share of 75,28%. Potential for emission reduction in the transport sector amounts to 54 176,58 tCO_2 or 24,57%. The smallest share of 0,14% in relation to the overall potential goes to the public lighting sector.

The comparison between CO_2 emissions for both scenarios in year 2020 and the emissions in year 2011 is given in the figure 9.6.

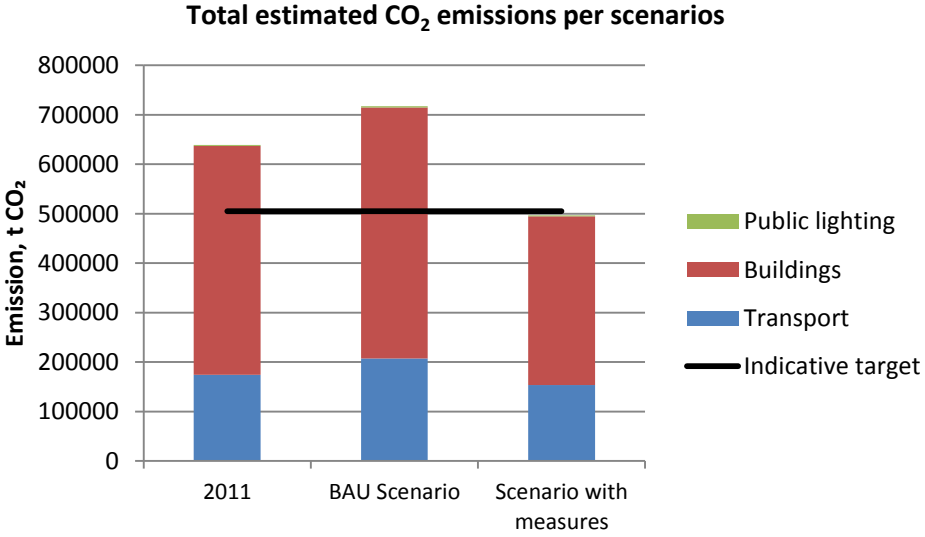

Figure 9.6 Total estimated CO_2 emissions per scenarios

9.5 Conclusions

For the purposes of assessing reduction of CO_2 emissions in year 2020 for identified energy efficiency measures in the building, transport and public lighting sectors in the City of Tirana, estimations of energy consumption and emissions trends in year 2020 were developed for two scenarios: scenario without measures (BAU scenario) and scenario with measures.

Emissions in year 2020 for scenario without measures will amount to 717 191,47 tCO_2, while the implementation of all planned measures will reduce CO_2 emissions in 2020 to amount of 496 706,67 tCO_2, giving a total inventory reduction of 22,28% compared to the base year.

It is important to mention, that the City has plans to implement a number of capital energy projects, which are currently under development, which will further contribute to achieving the goal of emissions reduction.

10 Mechanisms of financing the SEAP implementation

10.1 Budget of the City of Tirana

The City of Tirana, on conformity with the Law on Local Government, ensures the financing from the following sources:

- Local taxes and levies on movable and immovable property, as well as on the transactions conducted on them;
- Local taxes and levies on the economic activity of small businesses and on hotel residency, restaurants, bars and other services;
- Local taxes and levies on the personal income derived from donations, inheritances, testaments, and from local lotteries; and
- Other taxes and levies provided by law.

Through law, Tirana as well as other municipalities is empowered with the authority to independently obtain revenue to finance the exclusive functions under their jurisdiction.
The central government provides funds to the City to meet the requirements for the provision of shared and delegated functions.

The existing structure of budget includes all funding sources and expenditures. The revenue structure is discussed below.

1. **Revenues** (Local financing):
    1.1 **Own Local Government Revenues** (for covering operational and capital expenditures)
        1.1.1 Local taxes & fees2
            1.1.1.1 Local taxes[1]
            1.1.1.2 Local fees
        1.1.2 Non-tax revenues
            1.1.2.1 Rent
            1.1.2.2 Privatization of LGU assets
        1.1.3 Shared taxes
    1.2 **Grant/Unconditional Transfer** (transfer from the central government to local governments);
        1.2.1 Unconditional transfer for covering operational expenditures
        1.2.2 Unconditional transfers for investments
        1.2.3 Competitive grant - unconditional transfers for competitive investments
    1.3 **Conditional transfers** (from central government to local government thru the line ministries)
        1.3.1 Operational expenditures for wages and social & health insurance in education, health
        1.3.2 Other operational expenditures for maintenance and restructuring in education, health, infrastructure, tourism, etc.;

[1] Two of the local taxes, the tax on registration of vehicles and the tax on immovable property transfer, are legally defined as local taxes in the Law on Local Government Tax System. However, LGs have no discretion over the tax rate, the decision to levy the tax or not, and they do not collect it. Instead, the rate is set by the national Parliament and the tax is collected by the national government and thereafter transferred to the local government (less a fee for collection).

1.3.3 Capital expenditures on education, health, infrastructure, water supply, etc.
1.3.4 Expenditures on social assistance

The law on the Local Government Tax System defines the tax base as well as the minimum and/or maximum rates. For local taxes, local government can modify the tax base by +/- 30% of the tax rate by a decision of the local council. Communes and municipalities have the right to decide whether or not to apply a local tax.
In case they decide to apply the tax, they choose the tax rate, as well as the manner for collection and administration within the limits and criteria set forth in the respective law.
Local government also derives revenues from local fees for:

- Public services provided by the local government;
- The right to use municipal public property; and
- The issuance of licenses, permits, authorizations and issuance of other documentation, at the discretion of local government.

In addition to revenues with a fiscal nature, City can generate revenues from the economic activities, rents, and sale of property and from donations, interest income and penalties.

The Law on Local Government Borrowing No. 9869, dated February 4, 2008, allows the local government to borrow:

- For cash flow and investment purposes,
- From the capital market—financial institutions and banks, and
- On the domestic and international markets.

The loan maturity can be both short and long.
Short-term loans can be issued for:

- Maturity shorter than one budgetary year; and
- To finance temporary cash flow deficits, when operational expenditures are higher than revenues.

The request for a short-term loan should be first sent to the Ministry of Finance (MoF). If the MoF declines the request; the mayor may borrow directly from banks.
Short-term debt shall not at any one time exceed 10 percent (10%) of total actual revenues of the local government from local taxes and fees and shared taxes of the previous fiscal year.
Long-term loans can be issued for:

- Investment for public purposes; and
- Covering local functions—own, shared (and delegated if necessary).

The debt maturity must not be longer than the useful time of investment. The long-term debt is negotiated by the mayor (his staff) but the final decision is made by the local council.

Annual debt service must not exceed:

- Twenty percent of unconditional revenues (including owns source revenue, shared taxes, and unconditional grants) in previous three fiscal years; and
- Seventy-one percent of operational surplus (surplus 1.4 times > debt service).

Debt stock must not be higher than 130% of unconditional revenues.

The Budget for the year 2012 has been approximately 54 million Euros and according to the projections done by the city it is foreseen to grow up to more than 60 million Euros in 2015. The

revenues from its own sources (taxes and levies) are about 45 Mio Euro and unconditional revenues have been about 6.5 Mio Euro. The debt service for 2012 was about 0.2 Mio Euro.

About 65% of the budget is used for current expenses and about 35% for capital expenses. Almost 50% of the current expenses (about 17 Mio Euro) are used for operation and maintenance.

10.2 Other sources of funds or support

10.2.1 Energy Efficiency Fund (as in New Energy Efficiency Law)

According to the new Law on Energy Efficiency which is going to be approved in the coming months, it is foreseen the creation of the Energy Efficiency Fund. The Fund will be financed from the state budget, grants from international financing sources, donations from private sources, loans or other financial instruments from banks or investors and other financial incomes (e.g. interests for current accounts or bank deposits of the Fund, as well as the interests and commissions related to the financing agreements concluded with the Fund's clients)
The fund will provide grants, loans, financial guarantees and/or other types of financing that guarantee results.
The EE fund will be used to subsidize the delivery of energy efficiency improvement programmes and other energy efficiency improvement measures and to promote the development of a market for energy efficiency improvement measures.
The Energy Efficiency Fund will be used for financing the following activities:

- investments aiming at the improvement of energy efficiency in private and public buildings, industrial enterprises, and the transportation sector;
- investments aiming at the improvement of energy efficiency in extraction, production and transportation or transmission of energy;
- improvement of energy efficiency in public lighting;
- improvement of energy efficiency in water supply and waste water disposal
- development of demonstration projects in order to investigate and test new energy technologies or new organisational solutions for the energy sector;
- energy audits carried out in public sector;
- improvement of metering and informative billing
- research and development activities for increasing the energy efficiency;
- awareness campaigns and education activities regarding energy efficiency

10.3 EU Funds

10.3.1 IPA Funds (Instruments for Pre-accession Assistance)

The Instrument for Pre-accession Assistance (IPA) is the means by which the EU supports reforms in the 'enlargement countries' with financial and technical help. The IPA funds build up the capacities of the countries throughout the accession process, resulting in progressive, positive developments in the region.

IPA funding will amount to some €11.5bn over 2007-13. The current IPA Regulation (the legal basis for IPA funding) expires on 31December 2013.
To ensure that assistance to enlargement countries is not interrupted, the new IPA Regulation will enter into force on 1 January 2014 once approved by EU lawmakers.

City of Tirana can receive funding under component 3 of the IPA Programme; Regional Development – for investment in transport, environment and economic cohesion, and associated technical assistance. Participating in such programmes should help beneficiary countries to use EU regional funding more effectively once it becomes available (after they become EU member states).

10.3.2 Multi-beneficiary Programmes

This assistance is available for:
Regional projects that support cooperation between beneficiaries in different countries, promoting reconciliation, reconstruction and political cooperation (for instance, the Regional School of Public Administration (ReSPA), the Central European Free Trade Agreement (CEFTA) and the Regional Cooperation Council (RCC))
Horizontal projects that address the shared needs of several beneficiaries and achieve more efficient implementation and economies of scale in the following fields:

- political – democracy and the rule of law, human rights and the protection of minorities, regional issues and international obligations, interim civilian administration and civil society dialogue and development
- economic – competitiveness, cooperation with international financial institutions, education and youth
- ability to assume the obligations of membership – bringing legislation and standards into line with EU rules, in particular on the free movement of goods, intellectual and industrial property, veterinary issues, transport, energy, customs and taxation, statistics, environment, TAIEX, nuclear safety and radiation protection.

The assistance takes the form of

- cooperation with international financial institutions (e.g. EBRD, EIB, ECB) to mobilize funding
- civil society dialogue and development;
- education schemes (student mobility programmes, etc.)
- action to help beneficiaries meet the requirements for EU membership and align their standards with the EU (on statistics, customs procedures etc.)

Multi-beneficiary programmes complement individual national programmes by focusing on regional aspects and helping countries to learn from each other's experience.

10.3.3 FP 7 Funds (7th Research Framework Programme)

Research Framework Programmes are the main instrument at EU level aimed specifically at supporting research and development. They have two major strategic objectives: strengthening Europe's scientific and technological base and supporting its international competitiveness and the EU policies, through research cooperation among Member States and with international partners.
The 7th Framework Programme for Research, Technological Development and Demonstration Activities (EU FP7) lasts from 2007 until 2013 and has a total budget of over €50 billion. The money will be spent on grants to research actors of the European Union and with partners from outside Europe co-financing research, technological development and demonstration projects.

The programme fosters collaborative research across Europe and other partner countries in a number of key thematic areas. These themes are health; food, agriculture and fisheries; biotechnology; information and communications technologies; nano-sciences, nanotechnologies, materials and new production technologies; energy; environment (including climate change); transport (including aeronautics); socio-economic sciences and the humanities; space and security.

More information can be found at http://web.jrc.ec.europa.eu

10.3.4 TAIEX

TAIEX (Technical Assistance and Information Exchange) is an EU instrument that helps partner countries become acquainted with, apply and enforce EU law, and monitor their progress in doing so. It funds short-term peer-to-peer technical assistance, advice and training, provided mainly in 3 ways:

- workshops attended by officials from beneficiaries' administrations
- expert missions that provide in-depth advice to beneficiaries' administrations
- study visits to EU countries' administrations.

Activities in the Energy sector range from promoting renewable sources of energy to market liberalization in the oil, gas and electricity sectors. Support is also provided to the on-going implementation and enforcement of the multi-lateral Energy Community Treaty for South-East Europe, which provides the legal framework for an integrated energy market as well as enhancing security of supply.

As far as Environment policy is concerned, actions combine both responses to specific requests on the one hand, and programmed actions on the other. The main focuses of activity of TAIEX organized assistance in the area are:

- proper implementation of Environmental Impact Assessments (EIA) in support of applications for Cohesion Funds by many new Member States;
- full enforcement of the EU Drinking Water and Urban Waste Water Directives;
- waste and pollution management, particularly in the mining sector;
- waste management in ports;
- implementing the Integrated Pollution Prevention Control (IPPC) Directive;
- Europa Natura 2000 Network underpinned by the Habitat and Birds Directive and;
- Green Public Procurement

More information can be found at:

http://ec.europa.eu/enlargement/taiex/dyn/activities/infrastructure_en.jsp

10.3.5 Western Balkan Investment Facility - WBIF

The WBIF supports socio-economic development and EU accession across the Western Balkans through the provision of finance and technical assistance for strategic investments, particularly in infrastructure, energy efficiency and private sector development. It is a joint initiative of the EU, International Financial Institutions (IFIs), bilateral donors and the governments of the Western Balkans.

The essence of the WBIF process is the coordinated effort that goes into preparing and selecting investments for financial support, thereby “blending” internationally financed grants and loans with domestic finance to expedite the implementation of investments that leads to fulfillment of strategic

priorities defined in national, regional and EU accession policies contributing to socioeconomic development in the region.

Projects should contribute to competitiveness, growth and job-creation.
The WBIF provides grants and loans to support investments in infrastructure or specialized financial assistance programmes.
Grants can be for:

- Technical assistance to prepare infrastructure investments (e.g. to carry out a feasibility study etc.). To date, most of the grants approved have been for this type3.
- Technical assistance to overcome specific obstacles that are delaying the preparation or implementation (e.g. construction) of a priority investment project. However, it must be noted in order to consider and justify WBIF support for faltering projects there must be a thorough analysis of the causes of blockages accompanied by a clear and logical use of grant support that will lead to progress. As a general principal, WBIF will not add more subsidies to an existing investment but will consider support to improve the policy/regulatory environment relevant to the investment, through capacity building.
- Technical assistance to undertake research and analysis to facilitate the development of investments in a particular sector or sub-sector
- Technical assistance to support policy reforms and institution building required to improve the investment climate (usually as part of a large financing facility.
- Capital expenditure. For very particular cases where a funding gap is clearly identified.
- Incentive payments for financial intermediaries, for example with provision of SME financing.
- Interest rate subsidies. The cost of borrowing may be reduced where the need is justified; this is a facility provided by particular IFIs.
- Funding of insurance premium necessary to implement a project.

http://www.wbif.eu

10.3.6 The Western Balkans Sustainable Energy Direct Financing Facility (WeBSEDFF)

WeBSEDFF is an investment facility supported by the EBRD endowed with up to EUR 100 million of loan funds.
WeBSEDFF operates in Albania, Bosnia and Herzegovina, Croatia, FYR Macedonia, Montenegro and Serbia (including Kosovo). The facility is open to local small and medium enterprises (SME) or project developers to implement:

- Industrial energy efficiency
- Renewable energy projects
- ESCO: EE projects in public sector through ESCO contracts

Under the WeBSEDFF the EBRD provides direct loans from EUR 2 million (for certain countries from EUR 1 million) up to EUR 6 million

Under this scheme eligible borrowers can also obtain:

- technical consultancy services free of charge, provided by the Project Consultant, who supports the preparation of sustainable energy projects.
- incentive payments based on the estimated reduction of CO2 emissions resulting from project implementation.

Eligible projects are divided in:
Industrial energy efficiency projects - These comprise provision of equipment, systems and processes to cut primary energy consumption and/or final energy use of electricity, heat and/or fuels (either of fossil or renewable origin) and/or other forms of energy that can be ultimately related to the use of electricity, heat and/or fuels for production of goods and/or provision of services auxiliary to the production of goods: this includes all industrial sectors except for those barred by general rules.

Renewable energy projects - These comprise provision of equipment, systems and processes that exploit renewable energy resources for generating electricity, heat, cooling and/or any other form of energy that displaces fossil fuel use. Renewable energy sources comprise hydro, wind, solar, biomass, biofuels, biogas and geothermal resources.

http://www.websedff.com

10.3.7 GIZ – Open Regional Fund for South Eastern Europe (ORF)

Since 2006, German Federal Ministry of Cooperation (BMZ) has enhanced the effectiveness of this cooperation with the Open Regional Funds (ORF), implemented by GIZ (former GTZ).

Under the scheme, the South-East European countries submit their project proposals and GIZ helps to put them into practice. The process is fast and flexible, with minimal bureaucracy. The only prerequisite is that each project must involve cooperation between several countries and should support their efforts to move closer to the EU.

All projects must support the implementation of the relevant Stabilization and Association Agreements with the EU or promote compliance with the acquis communautaire – the body of European laws, rules and policies with which all EU Member States must comply.

The GIZ provides services such as advice, network building, knowledge management and training to enhance successful cooperation in dealing with the challenges of regional integration. Project partners in the region benefit from these services, while on the other hand they are invited to develop and suggest their ideas for projects to be implemented through the Open Regional Funds.

Preconditions for the support are:

- involvement of several countries and results must be transferable to other countries in the region;
- support EU harmonisation: by providing support for the Stabilisation and Association Process, or by implementing the Acquis Communautaire;
- contribute to the objectives of one of the four ORF sectors in focus.

There are four sectors in the focus of Open Regional Funds:

1. **ORF Foreign Trade** - promoting the region as a place where international clients find high quality goods and services as well as a supportive landscape of institutions for international trade and business.
2. **ORF Modernization of Municipal Services** – supports networking and knowledge generation among municipal associations and on municipal level in the fields of urban planning, fiscal decentralization, waste management, etc.
3. **ORF Energy Efficiency** - profiting from regional synergies for Energy Efficiency and Renewable - Energy Sources fostering harmonization with EU-Accession requirements.
4. **ORF Legal Reform** - supporting the regional cooperation in the reform of economic law by exchange of experience, identification of needs for harmonization and strengthening implementation.

10.3.8 European Investment Bank (EIB)

EIB has financed projects totaling 7.3 Bn Euro in the Western Balkans countries. The Bank's focus has been on the implementation of transport, energy, health and education projects, support for small and medium-sized enterprises (SMEs) and local authorities, industry and services, water and sanitation.
EIB supports investment efforts required:

- to meet the requirements of EU legislation
- to aid economic development prior to the start of membership negotiations

EIB Offers the following types of loans for Albania:

- Individual loans - These loans can cover up 50% of the total cost for both public and private sector promoters
- Intermediated loans - loans to local banks and other intermediaries which subsequently "on-lend" to the final beneficiaries who may be among others also local authorities
- Venture capital finance - acting as intermediaries – that provide finance to innovative high-tech SMEs in their early and growth phases

10.3.9 German Bank for Reconstruction (KfW)

KfW use funds provided out of the German Federal budget and add funds raised in the capital market ("KfW funds").
Depending on the needs of the partners, KfW finance programmes and projects either purely from federal budget funds (grants and/or loans at very advantageous IDA/standard conditions) or from a mixture of federal budget funds and loans from KfW funds (development loans). In addition, KfW offer loans at near-market conditions from pure KfW funds (promotional loans).

Least Developed Countries (LDC) receive grants that do not need to be repaid. Yet countries that are better off may also receive grants for special projects. This applies above all for projects targeting climate protection or poverty reduction. The loans offered at very low rates of interest (IDA conditions) for the financing of development projects are extended under special, internationally agreed conditions. For instance, countries with an annual per-capita income of currently up to 1,905 US-Dollar (status: 2011) are offered loans at a very low interest rate of 0.75 per cent p.a. and a maturity of 40 years.

Developing countries with an economic performance above this income threshold are granted either (standard) loan at a slightly higher interest rate of 2 percent with a maturity of 30 years, or tailored mixed (development) loans at significantly reduced interest rates and demand-driven maturities.

Priority areas of cooperation of KfW with Albania are water and energy, supporting also with grants energy efficiency in buildings and use of renewable energy sources.

www.kfw.de

10.3.10 Green for Growth Fund (GGF)

European Investment Bank and KfW German Bank for Reconstruction, with the support of the European Commission established in Eastern Europe a Green Development Fund in order to promote financial market development dedicated to lending projects of energy efficiency and renewable energy. Services offered by this fund include medium and long term lending, issuing warranties, debt securities and letters of credit.
Projects eligible for funding must ensure the reduction of energy consumption and CO_2 respectively for 20%, and incorporate energy efficiency and renewable energy sources. Funding applied directly or via partner banks with the following conditions:

- The fund normally financing up to 70% of the value of investment;
- The desirable size of the investment is from 2 - 10 million euro;
- Formed according to the market interest rate;
- Time of return adjusted according to the type of investment.

www.ggf.lu

10.4 Local Banks

Commercial banks have recognized the investment potential in the energy efficiency sector, which is clearly seen in specialized lines of credit for projects energy efficiency and renewable energy sources. Most credit lines are primarily intended for energy efficiency measures, with better financial conditions than normal credit lines. But the range of products was soon extended to the segment of renewable energy sources.

ProCredit Bank has introduced in early 2010 the so-called credit "Energy Efficiency" which is the financing of investment in business premises and dwellings that brings efficient use of energy and its conservation. Loans of energy efficiency will help families and businesses reduce energy costs and their example followed other banks. The financial means for this product are made available by KfW.

Societe Generale Albania offers the loan "Energy Economics Efficient!" so called Credit E ³. This loan enables the financing of projects of renovation of the apartment and other property (second home, shop, office, etc.) as well as the purchase of household appliances, the nature of which is aimed at reducing household energy consumption and protecting environment.

Credins Bank offers "Energy Efficiency Loan" which is directed to investment in thermal insulation of external or internal walls, installing new windows and doors, installation of devices that use solar energy, energy-saving air conditioners, heating system improvements, or other measures in order to use more energy efficiently.

11 Legislative framework for the implementation of the Sustainable Energy Action Plan of the City of Tirana

One of the important preconditions of a successful implementation of the Sustainable Energy Action Plan of the City of Tirana is its complete harmonization with the relevant national legislative.

11.1 Relevant regulations and documents of the European Union

Four basic targets of the European energy policy by 2020 are:

- decrease of greenhouse gases emission from the developed countries for 20%;
- increase of energy efficiency for 20%;
- increase of the share of renewable sources of energy to 20%;
- increase of the share of biofuels in traffic to 10%.

Main legislative documents which regulate the development of energy sector on the level of European Union (lined up chronologically) are:

- White Paper on an Energy Policy for the European Union, January 1996;
- Energy for the Future: Renewable Sources of Energy, White Paper for a Community Strategy and Action, November 1997;
- Green Paper „Towards a European Strategy for the Security of Energy Supply“;
- Green Paper on Energy Efficiency or Doing More with Less, June 2005;
- Green Paper on an European Strategy for Sustainable, Competitive and Secure Energy Supply, March 2006;
- Action Plan for Energy Efficiency: Realizing the potential - Saving 20% by 2020, October 2006;
- The proposal for European Energy Policy, January 2007;
- The proposal for EU energy efficiency plan, year 2011.

The Republic of Albania has also confirmed the Energy Charter and Protocol with:

- Law Nr. 8261 dt. 11.12.1997. for the ratification of the Energy Charter Treaty and the Energy Charter Protocol on Energy Efficiency and aspects of the environment;
- Law Nr.9560 dt.12.06.2006 on the Confirmation of Amendments of Commercial Provisions of the Contract on Energy Charter.

The Directives of European Union which regulate the field of renewable sources of energy use are:

- Directive 2001/77/EC on the promotion of the electricity produced from renewable energy source in the international electricity market, September 2001;
- Communication on Alternative fuels for Road Transportation and on a Set of Measures to Promote the Use of Bio fuels, November 2001;
- Directive 2003/30/EC on Promotion of the Use of Bio fuels for Transport, May 2003;
- Directive 2009/28/EC on the promotion of the use of energy from renewable sources and amending and subsequently repealing Directives 2001/77/EC and 2003/30/EC, 23rd April 2009.

The Directives of the European Union which directly or indirectly regulate the field of energy efficiency are:

- Directive 2003/87/EC for establishing a scheme for greenhouse gas emission allowance trading within the Community), November 2003.;

- Directive 2004/8/EC on the promotion of cogeneration based on a useful heat demand in the internal energy market), February 2004.;
- Directive 2004/101/EC for establishing a scheme for greenhouse gas emission allowance trading within the Community, in respect of the Kyoto Protocol's project mechanisms), December 2004;
- Directive 2006/32/EC on energy end-use efficiency and energy services, June 2006;
- Directive 2009/125 on setting the ecodesign requirements for energy-related products, July 2009
- Directive 2010/30 on the indication by labeling and standard product information of the consumption of energy and other resources by energy-related products, October 2010;
- Directive 2010/31 on the energy performance of buildings, November 2010;
- Directive 2012/27 on energy efficiency amending directives 2009/125 and 2010/30 and repealing directives 2004/8 and 2006/32, October 2012.

11.2 Legislative framework and regulations of the Republic of Albania

The most important energy policy documents are:

- Power Policy Statement, adopted in April 2002;
- The National Strategy of Energy which represent the basic policy document for the development of the Albanian energy sector up to 2015;
- The Energy Community Treaty for South East Europe, which was signed on October 25, 2005. The Treaty aims at creating a regionally integrated energy market for electricity and natural gas, as part of the wider EU market.

11.2.1 The National Strategy of Energy of the Republic of Albania

The National Strategy of Energy, formulated for the first time in 2003, has analyzed and has recommended the future changes of the energy sector in the Republic of Albania. The energy strategy, as an expression of the national demands, provides a sustainable development of the whole national economy and achieves at the same time the environmental protection during the whole cycle of the energy resources.
The strategy for the development of the energy sector is part of the general strategy for the economic development of Albania. This document has analyzed and included the necessary changes that should occur in order to increase the security of the energy supply and the optimization of the energy resources in order to meet the demands and achieve a sustainable economic development in the future. The Strategy contains a number of specific objectives, including:

- Increase in the security and reliability of the energy supply in general and electricity in particular, at national and regional levels;
- Establishment of an efficient energy sector with regard to financial and technical aspects;
- Establishment of an effective institutional and regulatory framework;
- Increase in the energy efficiency in the generation and use of energy resources aiming at a minimal environmental pollution;
- Optimization of the supply system with energy resources based on the least cost planning principle and minimal environmental pollution;
- Completion of restructuring process of energy companies;

- Increase in investments in the energy sector through capital enhancement by international financial institutions and private capital; and

Minister responsible for energy, through the National Agency of Energy (now the National Agency of Natural Resources - AKBN), shall develop and submit a National energy efficiency program to the Council of Ministers every two years for approval. The program shall be accompanied by a detailed economic evaluation.
Based on the National Strategy of Energy and on the obligations toward the Energy Community, the Ministry of Economy, Trade and Energy has developed the National Energy Efficiency Action Plan (NEEAP) and is developing the National Renewable Energy Action Plan (NREAP) at the moment. The goal of the NEEAP is the increase of the energy efficiency with 9% until 2016 and the objective of the NREAP is to have 36% of the total primary energy consumption by renewable energy sources. The objectives of NEEAP and NREAP will both be obligatory when the respective Laws will be approved.

11.2.2 Energy acts and subordinate legislation

The Power Sector Law

The Law No 9072 on power sector, dated 22nd May 2003, (Official Bulletin No. 53, page 2120; Date of publication: 03-07-2003), amended, is the primary law governing the power sector in Albania. The power sector law is based on the experience of the most developed countries and it tried to take into consideration many provisions of EU Directives:

- Directive 2005/89/EC of the European Parliament and of the Council of 18 January 2006 concerning measures to safeguard security of electricity supply and infrastructure investment,
- Directive 2003/54/EC of the European Parliament and of the Council of 26 June 2003 concerning common rules for the internal market in electricity and repealing Directive 96/92/EC - Statements made with regard to decommissioning and waste management activities,
- Regulation (EC) No 1228/2003 of the European Parliament and of the Council of 26 June 2003 on conditions for access to the network for cross-border exchanges in electricity.

The main goal of this law is the creation of a modern and more efficient power sector, which would attract private investment to secure a reliable electricity supply for all customers, and could enable Albanian electricity market to participate in the Regional and European electricity markets in compliance with energy policies of the European Union.
However, in view of the EU third legislative package and especially the new EU Directive 2009/72 of the European Parliament and of the Council of 13 July 2009 concerning common rules for the internal market in electricity and repealing Directive 2003/54/EC", Albanian Government has started a process of drafting a new comprehensive electricity law, which will fully comply with the requirements of the new package

The Energy Efficiency Law

In April 2005, the Albanian Parliament adopted Law No.9379 on energy efficiency, dated 28th April 2005. The purpose of this law is to create the legal framework required for the elaboration and enforcement of a national policy for the efficient use of energy and reducing energy losses in whole energy cycle.

The main issues of the law are:

1. *National Energy Efficiency Program*

The law stipulates that the Minister responsible for energy shall develop and submit every 2 (two) years to the Council of Ministers for approval of the National Energy Efficiency Program. The law requires that the program include a detailed economic evaluation of the potential for energy conservation and the financial savings.

2. *Energy Labeling*

The law (Article 7) stipulates requirements for the manufacturers or importers of household electrical appliances to provide such appliances with energy labels in Albanian language before selling them, in compliance with the Council Directive 92/75/EEC of 22 September 1992, "On the indication by labeling and standard product information of the consumption of energy and other resources by household appliances"

3. *Energy Audits*

The law stipulates that for the purpose of accurately measuring the level of utilization of energy facilities in order to improve their energy efficiency, the natural or legal persons who consume energy may be subject to preform energy audits.

4. *Energy Efficiency Fund*

The law requires the Council of Ministers to establish a special Fund to be used solely for energy efficiency and energy conservation purposes. The Energy Efficiency Fund may be financed from:

- annual funds from the state budget;
- grants from international financing sources;
- private sources;

However, the Energy Efficiency Law is not completed with secondary legislation and not yet implemented. The main barriers for implementation are the following:

- The goal and objective did not touch public relations, implementation of state policy on promotion of energy efficiency and services offered for its implementation;
- State functions on promotion of energy efficiency that were not clearly defined and that were vague on their duties;
- Uncertainties in the duties of responsible institutions on implementation of the Law on Energy Efficiency;
- National Strategy on Energy Efficiency and relevant action plans were expressed in general terms, without concrete definitions;
- The Law on Energy Efficiency's field of activity that was limited to industrial consumers only, without talking about households and energy traders;
- The Law on Energy Efficiency did not include Energy Efficiency Plans and Programs for Local and Central Government that are the basis for the function of the law;
- Activities and measures for promotion of energy efficiency were not defined;
- No clear definitions on securing and gathering information for promotion of energy efficiency;
- Limited activity and not good organization of the energy auditing process.

AKBN has already drafted a new Energy Efficiency Law, with improvements based on the Directive 2006/32/EC of the European Parliament and Council of 5 April 2006 on Energy end-use Efficiency and

Energy Services and on the Energy Performance in Buildings (EPBD) Directive which is going to be approved by the parliament in the coming months.

Law on conservation of thermal energy in buildings

Law on conservation of thermal energy in buildings established the necessary legal basis for setting up the rules and making mandatory actions for conservation of thermal heating in buildings.
This law stipulates that the designing and construction of buildings should meet the necessary technical parameters for conservation, saving and efficient use of energy.

Installation of thermal energy generation (heating generator or/and heating pumps) for heating or/and cooling of buildings shall be designed to reach internal air temperature, according to temperature comfort norms, taking into account climatic conditions of the area and functional purpose of the building.

Based on this law, the Council of Ministers sets norms, rules and designing and construction conditions, heat generation and conservation in buildings included in the energetic building code.

Energetic Building Code

On January 16, 2003 the Government adopted by a Decree of Council of Ministers "The Technical Norms of Heat Saving in Buildings", which contains norms, rules and conditions of designing, construction, production and conservation of thermal energy in buildings. Approval of this code was based on Law No. 8937, dated 12.09.2002 "On conservation of thermal heat in buildings".

The existing Building Code does not have a good implementation.

According to the Decree, the physical or legal persons dealing with designing of buildings, either private or public, shall observe these norms, rules and conditions. The Councils of Regulatory Adjustment in municipalities or counties approve construction permission only when the designs meet the requirements contained in this code.

Both, the law on the conservation of thermal heat in buildings and the energetic building code, comply with the Directive 2002/91/EC of the European Parliament and of the Council of 16 December 2002 on the energy performance of buildings.

The draft law on Renewable Energies, which will be approved by the parliament in the coming months will set an obligatory national target for the energy from renewable energy sources used for transport, space heating and cooling and power generation.

Amendment of the Law Nr. 10112, dated 09.04.2009 "On Condominium" will make it obligatory the installation of the Solar Hot Water Systems in residential buildings owned by more than two physical or legal entities. This amendment is also sent to the Parliament by the Ministry responsible for energy.

The production, transportation and marketing of biofuels and other renewable fuels for transport

On February 14, 2008 the Albanian Parliament approved law Nr.9876 for the production, transportation and marketing of biofuels and other renewable fuels for transport. This law regulates the production, trade and storage of biofuels and other renewable fuels to be used in transportation.

11.3 The relevant acts and documents of the City of Tirana

11.3.1 Physical Plan of the City of Tirana

In the last years Tirana has been undergoing major urbanism processes. Since 1990 after the falling of the communist regime, the population of Tirana region has been growing from 350.000 inhabitants in 1990 in about 800.000 inhabitants in 2010. The population within the City has been tripled during these years.
The last urban plan of the city was prepared in 1989 and it has not considered such developments. He became obsolete both in terms of city planning, also from the point of view of instruments used. During the years of transition, the plan was not prepared due to many reasons, from lack of human and financial capacities, to the economic interests connected with the construction business which was booming after 2000. This has had as a result the inefficient use of the territory, which is expensive and requires high mobility levels. Starting from this premises, the City decided to develop a new urban plan.

The Plan aims to be a working document that must coordinate the urbanism activities and to lead the public investments not only in the city but also in the whole Tirana region.
The Plan objectives are:

- To build a sustainable urban structure for Tirana region
- To lead the public investments as well as the private investments towards the urbanism of Tirana region
- To provide balance between private and public investments in the area; and
- To create an offer based on the principle of equal opportunities between the actors and factors of the urban development in the region

Although the Plan has not considered directly the issues of energy efficiency and the use of the renewable energies in the future developments of the city; some measures will have as a result the improvement of the energy efficiency mainly in the transport sector:

- Regarding public transport, the Plan suggests the creation of 4 tram lines (north-south line, south –north line, east-west line and west-east line), as well as the integration of the tram lines with the already existing public transport (busses) in order to make the public transport more attractive. The respective studies are already under preparation
- The plan supports the use of the bicycles. Within the city it will be adopted a network of bicycle lanes, and all the new roads that will be build and/or reconstructed must include also the bicycle lane

One of the main concerns is that there are not considered energy efficiency measures in the building sector, although construction of residential and educational building will be further extended. This issue has been stated as weakness also in the Strategic Environmental Assessment.

12 Monitoring and control of the SEAP implementation

The continuous monitoring, control and reporting concerning the results achieved is an important component in the process of preparing, implementing and monitoring the Sustainable Energy Action Plan of the City of Tirana. All Covenant of mayors cities are obliged every two years to prepare and send a Report on the action plan implementation to the European Commission. This report, besides the detailed description of all implemented measures and achieved results, should also contain a Monitoring Emission Inventory (MEI).The comparison between the 2011 BEI (Baseline Emission Inventory) and the one for some of the following years will, in fact, prove the actual CO_2 reduction in the City and will provide the answer as to whether the Action Plan was a success or not.

The recommendation from the European Commission points to the need to draft the Monitoring Emission Inventory every other year or maybe even every year. If it is found that the MEI preparation in every two years is a somewhat more complex task, than the recommendation of the European Commission is, in every two years, to switch between the preparation of a MEI-less Action Plan (2^{nd}, 6^{th}, 10^{th} year, etc.) and of an implementation Report containing MEI (in the 4^{th}, 8^{th}, 12^{th} year, etc.). The Action Plan will differ from the Report in the sense that the former should provide qualitative information about the implemented measures and activities, the realised energy savings and CO_2 emission reduction, while the latter should provide quantitative information. Both documents should encompass an analysis of the dynamics and the success of the identified measures' implementation, as well as proposals for corrective measures regarding cases when the implementation of the action plan measures proved unattainable or the results thereof unsatisfactory. In order to achieve as much simplified report preparation as possible, the European Commission will draft official forms for both report types.

The methodology of the Action Plan preparation also entails the implementation monitoring and control process necessarily conducted on several levels:

- Monitoring of the dynamics of the energy efficiency measure implementation in accordance to the measures and activities plan;
- Monitoring of the success of the project implementation according to the plan;
- Monitoring and control of the set energy saving objectives for every individual measure of the plan;
- Monitoring and control of the achieved CO_2 emission reduction for every measure of the plan;
- Monitoring and control of the achieved CO_2 emission reduction viewed in consumption sectors (buildings, transport and public lighting) as compared to the referential 2011;
- Monitoring of the total achieved CO_2 emission reduction in the City compared to the referential 2011.

The monitoring of the dynamics and the success regarding the implementation of the measures and activities plan will be carried out by the Energy Council, which, in the event of a heavy workload, shall establish a work group for monitoring and controlling the Action Plan implementation.

The preparation of a successful methodology for monitoring and control of the action plan implementation for the City of Tirana is rather complex, and its first step is determination of indicators, i.e. parameters and means of following them. Table 12.1 presents some proposed indicators of different categories, as well as the means to their monitoring and control in line with the recommendations and the classification of the European Commission.

Table 12.1 Proposal for the monitoring and control process regarding the implementation of the Action Plan of the City of Tirana

CATEGORY	INDICATOR	COMPLEXITY OF DATA COLLECTION 1 - SIMPLE 2 - MEDIUM 3 - COMPLEX	MONITORING MEANS
TRANSPORT	Number of commuters per year	1	Selection of representative bus routes to be monitored
	Length of the bicycle paths in the City	1	The City of Tirana
	Length of the pedestrian paths in the City	1	The City of Tirana
	Number of vehicles passing a checkpoint per year/month (determining a representative street for doing measurements)	2	Installation of vehicle counters at a given checkpoint (street)
	Total energy consumption of the vehicles owned by the City of Tirana	1	Exact data from the fuel bills through their conversion into kWh
	Total energy consumption of the commuter-transporting vehicles that use an alternative fuel	1	Data from the fuel bills converted into kWh
	Percentage (%) of City inhabitants with a favourable access to the city public transport	3	Conducting a survey among inhabitants in pre-determined parts of the city
	Average kilometres of daily traffic congestion in the City	2	Analysis of the traffic flow in pre-determined parts of the city
	Annual amount of fossil and alternative fuels sold at pre-determined petrol stations in different parts of the city	1	An agreement with pre-determined petrol stations for the continuous data collection and distribution
BUILDINGS	Total energy consumption in the buildings owned by the City of Tirana	1	Establishment of a data collecting information system
	Total square meterage of installed solar collectors in the area of Tirana	3	Data on the awarding of subsidies and credits for solar collector installation (if there are any) A survey conducted in pre-determined parts of the city
	Total electricity consumption in the City households	1	Data from electricity provider
Energy companies	Number of legal entities registered for different energy services, ESCO companies, producers and distributors of solar equipment, etc. in the City area	2	Register of commercial entities in the City
Citizens	Number of citizens of the city participating in different energy-related events (panel discussions, workshops, seminars)	1	Organising 4 thematic workshops a year in the field of energy efficiency, use of RES, sustainable buildings, etc.
Green public procurement	Selection of different categories of energy-efficient products and services (for e.g. energy-saving lamps in buildings owned by the City of Tirana)	2	Monitoring and comparison of the performance and the amount of the procured lighting fixtures for buildings owned by the City of Tirana

It is important to underline that the upper table is not definitive, for if needed, new indicators may be added, the monitoring and control of which will best exhibit the success of the Sustainable Energy Action Plan implementation for the City of Tirana.

13 Conclusions and Recommendations

The main goal of the Sustainable Energy Action Plan of the City of Tirana is to identify concrete measures for sectors of immediate energy consumption in Tirana, the realization of which will result in CO_2 emission reduction by more than 20% by 2020, in relation to the 2011 as baseline year. Methodology for development of the Action Plan is in accordance with the guidelines of the European Commission.

The sectors of immediate energy consumption in Tirana, according to the recommendations of the European Commission, include: building, transport and public lighting. Detailed energy analysis and the corresponding Baseline Emissions Inventory (BEI) for 2011, were developed per each sector. Furthermore, BEI of the city of Tirana was done in accordance with the Protocol of the Intergovernmental panel on climate Change (IPCC).

In order to carry out a detailed energy analysis, the building sector was divided into the three following subsectors:

- Buildings owned by the City of Tirana;
- Residential buildings (households);
- Commercial and service buildings in Tirana.

The transport sector has three subsectors:

- Transport fleet owned by the City of Tirana;
- Public transport in the City;
- Private and commercial vehicles.

The public lighting sector has no subsectors.

For the above mentioned sectors and sub-sectors required energy parameters for year 2011 were collected, and based on them the detailed energy analysis were conducted. Total energy consumption of the concerned sectors of the City of Tirana is 8 617,1 TJ, out of which 6 149,6 TJ (71,37%) was spent in buildings sector, followed by the transport sector with consumption of 2 442,6 TJ (28,35%). Electricity (5 040,9 TJ) is the energy type with highest share in buildings sector, while the transport sector consumed mostly gasoline (1 308,3 TJ) and diesel (1 256,4 TJ).

Total emission of inventory is 639,1 kt CO_2. The largest emission source, and the source of energy consumption, is the building sector with the emission amounting to 462,9 kt CO_2, followed by the transport sector with the emission of 174,3 kt CO_2.
Based on the conducted energy analysis and concrete situation in Tirana, the identified measures were divided into three main groups:

- Measures for CO_2 emissions reduction in the building sector;
- Measures for CO_2 emission reduction in the transport sector;
- Measures for CO_2 emissions reduction in the public lighting sector.

Regarding building sector, total of 27 measures for decrease of energy consumption and CO_2 emissions reduction were identified as follows:

- General measures: planning and promotion – 7 measures:
- Buildings owned by the City of Tirana – 8 measures;
- Residential buildings (households) – 6 measures;
- Commercial and service buildings – 6.

Identified measures for the transport sector of the City of Tirana (14) were divided into following categories:

- Legal and planned measures – 5 measures;
- Promotion, information and education measures – 4 measures;
- Vehicles owned/used by the City of Tirana – 1 measure;
- Public transport – 3 measures;
- Private and commercial vehicles – 1 measure.

The realization of all proposed measures in all three analyzed sectors of energy consumption in the city of Tirana will result in the reduction of CO_2 emissions by 22.28 % in relation to baseline emissions from 2011. Having in mind that the indicative goal is reduction by 21%, its realization does not require the implementation of all measures, but rather the selection of most acceptable measures

Identified measures were presented in tables with the following parameters:

- Short description of measure;
- Implementing body;
- Time dynamics of implementation (the beginning and the end);
- Estimated costs (Euros);
- Estimated energy savings (MWh or TJ);
- Potential emissions reduction (tCO_2);
- Available financial instruments for implementation (national or international).

Generally, ten basic recommendations for achieving maximum efficiency of SEAP implementation are:

1. Secure the support of as large number of stakeholders as possible;
2. Build an organizational structure for the SEAP implementation based on the knowledge and abilities;
3. Establish successful sheme for continuous collection of requested energy indicators of each subsector;
4. Establish Systematic Energy Management in buildings owned by the City of Tirana;
5. Identify available national and international financial sources for SEAP implementation – City budget should be the last option if there are no other financial sources at all;
6. Prepare quality sustainable energy projects in all energy sectors and subsectors in the City: A good project will always find its investors!;
7. Develop regularly Emission Inventory for the City of Tirana;
8. Implement proposed measures systematically and responsibly;
9. Monitor and control the SEAP implementation systematically and responsibly;
10. Inform and involve citizens of Tirana about the whole process of SEAP development, implementation and monitoring.

The most important steps for building the successful organizational structure for SEAP implementation are the following:

1. Join the EU Covenant of Mayors initiative;
2. Nominate the coordinator of the process of SEAP preparation, implementation and monitoring;
3. Appoint the Energy City Council as an advisory professional body;
4. Appoint the Working group for SEAP implementation.

The coordinator of the process of preparation, implementation and monitoring of the Action Plan should be a person from the City administration most knowledgeable about energy issues of the City. The coordinator is the key figure in the implementation of the Action Plan, who brings all important decisions from the onset, and who proposes the establishment of all working groups and monitoring bodies necessary for implementation. Energy City Council should gather renowned experienced experts with great knowledge and vision.

The implementation of proposed measures will enable direct energy and financial savings, reduce harmful effect on the environment, improve the quality of life, and raise the level of responsibility and awareness among citizens, which is a strategic commitment and goal of the policy of responsible government in the City of Tirana.

14 Risks and Assumptions

14.1 Impact of Continuing Urban Growth on Energy Consumption Figures:

The City of Tirana has experienced a rapid urbanization and population growth in the last two decades. Tirana's population has grown from 250,000 in 1990 to 620,000 in 2011 within the administrative area of the Municipality of Tirana (MoT). For the year 2025 the metropolitan area of Tirana (including the communes on the periphery) are estimated to amount to 1 million or more inhabitants. The extreme population growth has directly influenced the annual energy consumption of the city. The data reported in this SEAP document indicate that for the baseline year 2011, the total energy consumption of the city was 2.4 million MWH. The energy consumption of the public sector (municipal buildings and fleets, public transport and lighting) takes 4.4% while the private sector (residential, commercial and service buildings, personal and commercial vehicles) 95.6% of the total energy consumption. The same figures are indicated for the CO_2 Emission for 2011. The respective figures about the annual energy consumption and CO_2 consumption are summarized in the tables below.

Table 14.1 Energy Consumption for 2011 (MWH) (%)

Energy Consumption 2011 (MWH) (%) 2.393.651						
Public				Private		
105.287				2.288.364		
4,40%				**95,60%**		
Municipal Buildings	**Municipal fleet**	**Public transport**	**Lighting**	**Residential Buildings**	**Commercial and Service Buildings**	**Personal and commercial vehicles**
20.348	3.921	74.123	6.895	1.132.242	555.646	600.476
19,33%	3,72%	70,40%	6,55%	49,48%	24,28%	26,24%

Table 14.2 CO2 Emission for 2011 (t) (%)

CO2 Emission 2011 (t) (%) 639.093						
Public				Private		
28.320				610.772		
4,43%				**95,57%**		
Municipal Buildings	**Municipal fleet**	**Public transport**	**Lighting**	**Residential Buildings**	**Commercial and Service Buildings**	**Personal and commercial vehicles**
5.708	1.032	19.615	1.965	300.426	156.747	153.600
20,16%	3,64%	69,26%	6,94%	49,19%	25,66%	25,15%

Referring to the SEAP study and taking into account both scenarios (BAU scenario and scenario with measures) the results of the energy consumption and CO_2 emission for the year 2020 indicate a small increase of 1.5% for the public sector comparing to the private sector. The share of percentage is shown in the tables below:

Table 14.3 Energy Consumption for 2020 BAU scenario (MWH) (%)

Energy Consumption 2020 BAU scenario (MWH) (%) 2.678.785						
Public				Private		
113.163				2.565.623		
4,22%				**95,78%**		
Municipal Buildings	**Municipal fleet**	**Public transport**	**Lighting**	**Residential Buildings**	**Commercial and Service Buildings**	**Personal and commercial vehicles**
12.016	4.667	88.205	8.274	1.234.143	616.767	714.713
10,62%	4,12%	77,95%	7,31%	48,10%	24,04%	27,86%

Table 14.4 Energy Consumption for 2020 scenario with measures (MWH) (%)

Energy Consumption 2020 scenario with measures (MWH) (%) 1.865.945						
Public				Private		
111.958				1.753.985		
6,00%				**94,00%**		
Municipal Buildings	**Municipal fleet**	**Public transport**	**Lighting**	**Residential Buildings**	**Commercial and Service Buildings**	**Personal and commercial vehicles**
12.016	4.665	88.117	7.161	881.764	369.111	503.110
10,73%	4,17%	78,71%	6,40%	50,27%	21,04%	28,68%

Table 14.5 CO2 Emission for 2020 BAU scenario (t) (%)

CO_2 Emission 2020 BAU scenario (t) (%) 717.192						
Public				Private		
32.922				684.270		
4,59%				**95,41%**		
Municipal Buildings	**Municipal fleet**	**Public transport**	**Lighting**	**Residential Buildings**	**Commercial and Service Buildings**	**Personal and commercial vehicles**
5.994	1.228	23.342	2.358	327.464	173.989	182.817
18,21%	3,73%	70,90%	7,16%	47,86%	25,43%	26,72%

Table 14.6 CO2 Emission 2020 scenario with measures (t) (%)

CO_2 Emission 2020 scenario with measures (t) (%) 496.707						
Public				Private		
29.906				466.801		
6,02%				**93,98%**		
Municipal Buildings	**Municipal fleet**	**Public transport**	**Lighting**	**Residential Buildings**	**Commercial and Service Buildings**	**Personal and commercial vehicles**
3.378	1.145	23.342	2.041	233.360	104.718	128.723
11,29%	3,83%	78,05%	6,82%	49,99%	22,43%	27,58%

Based on the above figures it is clearly visible that the implementation of all the measures regarding the reduction of energy consumption and CO_2 emission within the public sector will not have significant impact compared with the actual values of 2011. The Municipality's objective therefore must be focused on measures for reducing the energy consumption and CO_2 emission within the private sector, especially the consumption from residential buildings.

14.2 Impact of Existing Building Stock on the Energy Performance:

The number of existing building stock in the metropolitan area of Tirana is very high. Even though in the last years the Municipality of Tirana has tried to prevent the urban growth by reducing the building construction permits the communes in the suburban areas of Tirana developed rapidly and have created a big residential building stock. This uncontrolled urban development has affected the total amount of energy consumption, especially since during the peak construction time from 1998 to 2008 no energy efficiency measures were implemented or integrated in the process. In order to address this building stock and additional to making energy efficiency regulations new buildings the MoT should also especially focus on measures/requirements regarding energy consumption improving the quality of the existing building stock.

Furthermore, other risks that may lead to unreliable and unrealistic result of these foreseen actions should be considered. The urban development is in continuous transformation and it's important to consider the fact that it's hard to keep it under control. In the New General Urban Plan approved in 2012 by the MoT, is a total increase of 10% of new building stock is forecast these new buildings shall be built based on new regulation containing energy efficiency standards enhancing and reducing the total energy consumption. Yet, whatever measures are taken to reduce the energy consumption, on the new building stock still will be an increase for sure. *In order to understand the real effects of to measure the real impact of measures to be taken in the future by the MoT in regards of reducing energy consumption the ratio "energy consumption per capita, or per m^2" should be added to the monitoring of the SEAP or energy consumption values.*

14.3 Dependency on Energy Policies & Legislation outside of Local Government Authority:

The MoT will initiate the required measures and legal requirements as far as possible and allowed for the authority of the local government in Albania.

A law on "Energy Efficiency" is under process of development on National Government (Ministry of Energy & Industry) level but not yet finalized nor put into power yet. Therefore the MoT has a restricted legal framework to operate on and will have to adapt their strategies or measures to national policies and legal requirement as soon as made official.

Another important fact to be considered is the policy of the national government in regards of the energy price (cost per consumed KWh). In case the National Government decides to introduce a reduction of the electricity price the incentive of the private/residential sector to invest into energy efficiency measures will be automatically lowered immensely. As the local government has very little legal or executive power of controlling the existing building stock sector the measures or possible incentives foreseen might have no effect.
A positive result of the SEAP and the monitoring of measures regarding energy consumption is therefore highly depending on the policies decided on the national government level.

14.4 Impact of the Deficiencies of the Existing Infrastructure Network:

Lastly, the existing electrical network/infrastructure is very amortized and insufficient. Stronger control and measures have to be taken against abuse or illegal intervention into the public network in the future. All date raised in this report might be therefore not very representative and would need to be adjusted over time in line with the enhanced management and control of the system.