



2010-2020



Kadıköy Municipality Sustainable Energy Action Plan



Foreword

Energy potential of a country is one of the most basic factors that effects her economic and social development. Furthermore, it also enhances the quality of life of the people living in that country. Similar to Türkiye, demand for energy is increasing day by day all over the world. Analysis that was made in the last 10 years has shown that there is an increasing rate of usage in electricity and natural gas in Türkiye which is the highest rate in Europe, and the second in the world after China. In Türkiye investments in energy sector are mainly focused on fossil fuels.



There must be a shift to innovative solutions which will increase the usage of renewable energy sources which is considered as one of the main measures of protecting the environment. According to the United Nations, in 2011 urban areas are responsible for 80 percent of worlds' energy consumption. Besides in Türkiye, 75 percent of total populations are living in urban areas. These ratios define how the implementation of energy action plans and energy reduction targets are important at urban scale.

Kadıköy Municipality has been involved in many energy efficiency activities at institutional scale since 2010 aiming to meet the environmental objectives. In order to achieve our vision, which is "To be a municipality which is a leader in Türkiye and a model to the world"; we signed the Covenant of Mayors and committed to institute a sustainable and healthy environment and better quality of life in our city. As a signatory, Kadıköy aims 20 percent reduction in carbon emissions by 2020 in its jurisdiction. Specifically, emission reduction projects are consisted of building and public lighting oriented projects, rising public awareness, renewable energy uses in buildings, public lighting and transportation facilities.

This report defines efficient set of actions for the future of Kadıköy, but it is crucial that we must act together with the city partners including government, universities and schools, private sector, voluntary institutions and civil society bodies, to reach sustainable life standards for our families, our neighborhoods and for the future generations.

Selami Öztürk
Mayor of Kadıköy

Contents

Foreword	2
Figures	6
Tables	6
Pictures	6
List of Abbreviations	7
Executive Summary	8
1. Introduction	10
1.1. What is Climate Change?	11
1.2. The Economic Reflections of Climate Change	13
2. Republic of Türkiye	14
2.1. Economic Perspective of Türkiye	17
2.2. Energy Perspective of Türkiye	19
2.3. Transport Choices of Türkiye	20
2.4. Environment Perspective of Türkiye.....	21
3. International Protocols & Agreements to fight Climate Change	22
3.1. Türkiye’s Position at Climate Change Fight.....	24
3.2. Laws and Regulations on Energy Efficiency in Türkiye	25
4. Kadıköy District	26
4.1. Kadıköy’s Economical Perspective.....	27
4.2. Kadıköy’s Transportation	28
4.3. Public Transport.....	28
5. Kadıköy Municipality	31
5.1. Duty and Jurisdiction of Kadıköy Municipality.....	31
5.2. Kadıköy Municipality Service Categories.....	32
5.3. Kadıköy Municipality’s Efforts Against Climate Change and Energy Efficiency Initiatives.....	36
5.3.1. Cities for Climate Protection	36
5.3.2. “No Plastic Bag!” Campaign	36
5.3.3. Corporate Greenhouse Gas Inventory Development Project	38
5.3.4. Electricity Efficiency Improvement Project (EEIP)	40
5.3.5. Zübeyde Hanım Wedding Hall & Municipality Building Outdoor Lighting Replacement to LED	41
5.3.6. Kadıköy Municipality Head Office Solar Collector	42

5.3.7. Criteria Development for Sustainable Districts Project	42
5.3.8. Municipality's Service Vehicles Transformation to Electrical Vehicles	44
5.3.9. Covenant of Mayors Agreement of Municipality	45
6. Methodology	47
6.1. Defining the Methodology	47
6.2. Baseline Emission Inventory	51
7. Results	54
7.1. CO ₂ Emissions of Kadıköy	54
7.2. Kadıköy Municipalities' Carbon Emissions	57
8. Measures to Reduce CO₂ Emissions	60
9. Emission Reduction Project	62
9.1. Lighting Oriented Projects	62
9.2. Electrical Vehicle Concept Projects	63
9.3. Renewable Energy Projects	65
9.4. Buildings Oriented Projects	68
9.5. Awareness- Oriented Projects	71
10. References	78
11. Appendixes	80
12. Appendixes	81

Figures

Figure 1 - Global Temperature Change Index	13
Figure 2 - Map of Türkiye Provinces	15
Figure 3 – Administrative Map of Türkiye.....	16
Figure 4 - Map of Kadıköy	26
Figure 5 - Subway Station Map	30
Figure 6 - Greenhouse Gas Emission of Kadıköy Municipality.....	39
Figure 7- Climate Change and Energy Efficiency Platform	46
Figure 8 - Total Emission of the Kadıköy District.....	54
Figure 9 - Total Energy Consumption of the Kadıköy District.....	55
Figure 10 - 2020 Projection of CO ₂ emission	60
Figure 11 - 2020 Projection by Sectors.....	61

Tables

Table 1 - Green areas of the region (m ²)	35
Table 2 - Definitions of 'Carbon Footprint' from the Grey literature	49
Table 3 - The division of Scopes	51
Table 4 - Total Energy Consumption of the Kadıköy District.....	55
Table 5 - Total CO ₂ e Emission of the Kadıköy District	56
Table 6- Scope 1 CO ₂ Emissions	57
Table 7 - Scope 2 CO ₂ Emissions	57
Table 8- Scope 3 CO ₂ Emissions	58
Table 9 - The amount of CO ₂ that Kadıköy is Responsible for.	58
Table 10 - Total CO ₂ e / per capita Emissions in Kadıköy District.....	58

Pictures

Picture 1 – A view of Kadıköy-Altıyol	27
Picture 2 – Historic Kadıköy Bazaar & Haydarpaşa Rail Station	27
Picture 3 – A view of Bostancı	28
Picture 4 - Moda Nostalgic Street Railway	29
Picture 5 – Kadıköy Municipality Building	31
Picture 6- Süreyya Opera House	33
Picture 7 - Mammography & Women's Health Center.....	33
Picture 8 - Göztepe Liberty Park.....	35
Picture 9 - No Plastic Bag Campaign.....	37
Picture 10 - No Plastic Bag Campaign.....	38
Picture 11 - President's Office	40
Picture 12- Solar Collector on the roof of Kadıköy Municipality	42
Picture 13 - Sustainable Green Neighborhood	43
Picture 14 - Gray Water Treatment System	44
Picture 15 - Electric Vehicles	44
Picture 16 - Electric Garbage Truck.....	45
Picture 17 – Workshop, 10 May 2013.....	59

List of Abbreviations

BSEC	Black Sea Economic Cooperation
CAD	Current Account Deficit
CCS	Carbon Capture and Storage
COM	Covenant of Mayors
DECC	Department of Energy and Climate Change
EFTA	European Free Trade Association
EIP	Efficiency Improvement Project
EPA	Environmental Protection Agency
EU	European Union
EU ETS	Europe Emissions Trading System
FDI	Foreign direct investment
GDP	Gross Domestic Product
GDP	Gross Domestic Product
GHG Emissions	Greenhouse Gas Emissions
GHG Protocol	Greenhouse Gas Protocol
GNP	Gross National Product
GOT	Government of Turkey's
ICLEI	Local Governments for Sustainability
IEAP	Emissions Analysis Protocol
IMM	Istanbul Metropolitan Municipality
IPCC	International Panel of Climate Change
NACCP	National Climate Change Action Plan
NASA	National Aeronautics and Space Administration
NATO	North Atlantic Treaty Organization
OECD	Organization for Economic Cooperation and Development
OSCE	Organization for Security and Cooperation in Europe
REC	Regional Environmental Center
SEAP	Sustainable Energy Action Plan
TAP	Trans-Adriatic Pipeline
TCDD	The Republic of turkey Railway
TENs	Trans-European Networks
TPES	Total Primary Energy Supply
TUPRAŞ	Turkey Petroleum Refineries Corporation
UKBS	Borough Info System
UNDP	United Nations Development Programme
UNFCC	United Nations Framework Convention on Climate Change
UNFCCC	United Nations Framework Convention on Climate Change
WTO	World Trade Organization

Executive Summary

The Kadıköy District has committed itself to reducing its greenhouse gas emissions by at least 20% from 2010 by the year 2020 in its fields of activity within the city's sphere of authority. 2010 was chosen as the baseline year, due to the availability of reliable data. The achieved reduction in emissions will be a result of both long-term energy-saving work and attitude changes of the local public. Decreasing the total amount of emissions has been made more difficult in the long term due to the increase in the city's population.

The share of the municipality's own activity in the total amount of carbon dioxide emissions is approximately 2%. Even if the city were to decrease the emissions caused by its own activity by more than 20%, the effect on the total emissions in the city would not be distinguished. Therefore the measures have to focus on other sectors mostly. It is possible for the city to influence the carbon dioxide emissions caused by its own energy use, but it is also partly possible to influence missions caused by energy use in other sectors, through tools such as building retrofitting, increasing the awareness and the supply of advice services, and more generally by acting as a good example and spreading information on best practices. Approximately 40% of the emissions in the city are estimated to be within the power of the city. So that, the emissions presents under Scopes 1,2,3 are the emissions which Kadıköy has a jurisdiction to intervention.

This action plan presents measures for reducing the carbon dioxide emissions caused by energy consumption especially in buildings which represents 41% of overall consumption and emission release. The most important methods are low-energy construction; the adaptation of energy-efficient technology in buildings, services; consolidation of the city structure; increasing the use of public transportation and the number of pedestrians and cyclists; and different types of advice services in relation to energy-efficient living, working and movement.

The aim of the Covenant of Mayors is to reduce carbon dioxide emissions in cities by at least 20% in the fields administered by the city. This target is demanding, and reaching it will require seamless cooperation between the municipal organization and different actors in the city. The role of the Turkish Government and Istanbul Metropolitan Municipality are also important in reaching the goal.

1. Introduction

“Climate is what you expect and Weather is what you get”.

- Mark Twain

Mark Twain is one of the most legendary authors lived on earth. He is famous for his book “The Adventures of Tom Sawyer”. While we were thrilled with Tom, he was also providing a vision for today’s world. Therefore, his expression towards the differentiation of the terms on climate and weather is so effective and eye- opening.

To understand climate change, it is important to recognize the difference between weather and climate. Weather is the temperature, precipitation (rain, hail, sleet and snow) and wind, which change hour by hour and day by day. (NASA, 2008) Climate is the average weather we expect over a long period of time. (Thorntwaite, 1948) So, while the weather brings different temperatures all over the world on a day to day basis, over a year we would expect the climate to bring an average temperature to the region observed.

The climate is controlled by two major factors; the sun, and the atmosphere. Those are shaped by various gases. While sunlight provides the energy which heats the Earth, atmosphere prevents that heat from escaping. Cycle of gases establish the structure. Known gases (greenhouse gases) in the atmosphere such as water vapor, CO₂ and methane allow sunlight to pass through, but then stop the heat from escaping back out into space. Scientists explained the heat-trapping effects of greenhouse gases more than 150 years ago. Research has shown that, without the greenhouse effect, the Earth would be about 30 °C cooler - making it uninhabitable to most forms of life. Because they're so effective in keeping the planet warm, we know that any changes in the amount of greenhouse gases in the atmosphere will affect the Earth's temperature. (EPA, 2013)

1.1. What is Climate Change?

The Earth's climate has been relatively stable since the end of the last ice age, which was approximately 10,000 years ago, but it is now changing. The climate of the Earth though is not static, and has altered many times in response to a variety of natural causes including interactions between the seas and the atmosphere, changes in the Earth's orbit, fluctuations in energy received from the sun and volcanic eruptions. (Bankoff, 2003)

Human interaction and some natural conclusions created today's global climate situation. We now are experiencing the so called "Climate Change". The term 'climate change' refers to changes that have been observed since the early 1900s. There are several definitions on it. One of the rational and explanatory definitions is from United Nations Framework Convention on Climate Change (UNFCCC): A change in climate which is attributed directly or indirectly to human activity that alters the composition of the global atmosphere and that is in addition to natural climate variability over comparable time periods.

This specific term, climate change is defined as temperature differentiation over time. So that changes in sea level, precipitation change, droughts, floods and storms are result of this effect. In 2007, the Intergovernmental Panel on Climate Change (IPCC) concluded that most of the observed increase in global average temperatures since the mid-20th century is very likely due to the observed increase in anthropogenic (man-made) greenhouse gas concentrations.

Greenhouse gases which are naturally generated by vegetation and humans are sourced from atmosphere by natural activities. (Revelle, 1957) Therefore, it can be said that humans' biological activities does not play a negative role in this circle. Negative effects of earth's locals start with the "extra-curricular activities" that have been created. Some extra-curricular activities can be counted as industrialization, highly urbanization and some farming practices. Those are maintaining bad influence on natural greenhouse cycle and trigger the unwanted chain reaction.

Climate Change is the unbearable fact of the 21st century, and mainly it is caused by the release of greenhouse gases to the atmosphere. One of the well-known greenhouse gases is CO₂. It has significant contribution to global warming with other human- produced greenhouse gases. The major source of it is rising from burning

fossil fuels which are coal, gas, and oil (including petrol and diesel used in cars). In addition to those sources; heating and power systems in dwellings are contributing to overall GHGs.

Climate change is also the key driver for a raft of international, European and national policy aimed at reducing CO₂ emissions and improving energy efficiency. In 1992, United Nations Framework Convention on Climate Change is established in order to decrease the level of CO₂ released. However, the required amounts have not been reached with the pact. Therefore, in 1997 Kyoto Protocol is signed with the collaboration of developing countries. It was differentiating itself from UNFCCC with its legally binding character. It forced parties to reduce their greenhouse gases. (Climate Leaders, 2009)

In 2010, Cancun agreement refreshed the target level and it is declared as global warming should be below 2.0 °C (3.6 °F) relative to the pre-industrial level (King, 2011). The rate of change can be observed in Figure 1. Global Temperature Change Index. After industrialization has increased in developing countries like Germany, USA the warming globally increased. Supported by technological improvements and enlargement of urban areas, 1980's rapid industrialization created a base to tremendous alteration in weather conditions. As it is displayed in the figure developed by NASA, in 1990s temperature is jumping one level to another. This is so scary for all of us. So, UN declared temperatures have already risen about 1.4 degrees Fahrenheit (0.8 Celsius) above that level. (UN Report, 2012) A recent projection by the World Bank showed that temperatures are on track to rise by up to 7.2 Fahrenheit (4 Celsius) by the year 2100. Therefore, in the enlightenment of this fact, in Doha with the participation of developed countries, the Kyoto Protocol is extended to 2020. In addition to that, many mitigating solutions must be taken, immediately.

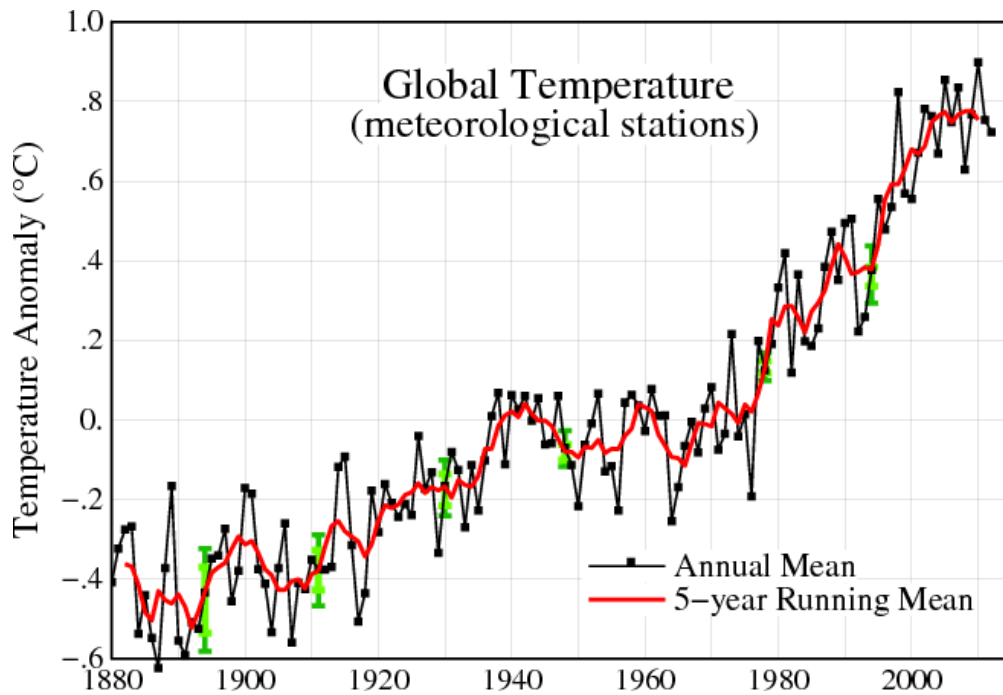


Figure 1 - Global Temperature Change Index

Source: NASA, http://data.giss.nasa.gov/gistemp/graphs_v3/fig.A.gif

1.2. The Economic Reflections of Climate Change

At the end every door opens to finance. Therefore, economic analysis of the climate change is tremendously essential. One of the leading and prestige reporting agency “Stern” published a paper on climate change’s economical reflection. The report makes it clear that climate change is a serious global threat, and that the costs of reducing emissions and proactively adapting to a changing climate are far less than the future risks and damage of global warming.

It has been conducted in report that in upcoming future, at least 5%, and as much as 20%, of global GDP(Gross Domestic Product) each year will be affected. If adequate measurements taken to reduce greenhouse gas emissions to avoid the worst impacts of climate change could limit the reduction to about 1% of global GDP each year.

To illustrate the economic consequences of natural disasters, the two intense storm surge events occurred in January and October of 2000 along the southeastern coast of New Brunswick can be observed. It caused more than \$4.6 million in damages (October 2000- \$2.6 million, January 2000 - \$2 million). The cost of creating

mitigation and adaptation plans could be high in numbers in short-term, however in long-run it is more rational and cost-saver. For 2020, the big industry leaders are always emphasizing that cost of production decreases when they consider the greenhouse gases level to decrease in the same trend.

2. Republic of Türkiye

Located at the crossroads between Europe and Asia, Türkiye has a rich cultural and ethnic diversity. Türkiye is a transcontinental Eurasian country. Asian Türkiye (made up largely of Anatolia), which includes 97% of the country, is separated from European Türkiye by the Bosphorus, the Sea of Marmara, and the Dardanelles (which together form a water link between the Black Sea and the Mediterranean). European Türkiye (eastern Thrace or Rumelia in the Balkan Peninsula) comprises 3% of the country. Türkiye is bordered by eight countries: Bulgaria to the northwest; Greece to the west; Georgia to the northeast; Armenia, Azerbaijan (the exclave of Nakhchivan) and Iran to the east; and Iraq and Syria to the southeast. The Mediterranean Sea and Cyprus are to the south; the Aegean Sea is to the west; and the Black Sea is to the north. The Sea of Marmara, the Bosphorus and the Dardanelles (which together form the Turkish Straits) demarcate the boundary between East Thrace and Anatolia; they also separate Europe and Asia.

Türkiye is a founding member of the Organization for Economic Cooperation and Development (OECD), and a member of the Council of Europe, the Organization for Security and Cooperation in Europe (OSCE), North Atlantic Treaty Organization (NATO), the World Trade Organization (WTO) and the European Free Trade Association (EFTA) and candidate for the European Union.

In 1992, Türkiye and 10 other regional nations formed the Black Sea Economic Cooperation (BSEC) Council to expand regional trade and economic cooperation.

Türkiye is a parliamentary representative democracy. Since its foundation as a republic in 1923, Türkiye has developed a strong tradition of secularism.

Türkiye administratively has 81 provinces. The provinces are further divided into districts (provincial or boundaries, singular ILCE) and districts that can levy taxes and pursue other initiatives. The provincial capital (usually called central ILCE) usually

carries the name of the province, with the following exceptions: Hatay (capital: Antakya), Kocaeli (capital: İzmit) and Sakarya (capital: Adapazarı).



Figure 2 - Map of Türkiye Provinces

Moreover, the country is geographically divided into seven regions: Aegean, Black Sea region, Central Anatolia Region, Eastern Anatolia region, the region of Marmara, Mediterranean and Southeast Anatolia region.

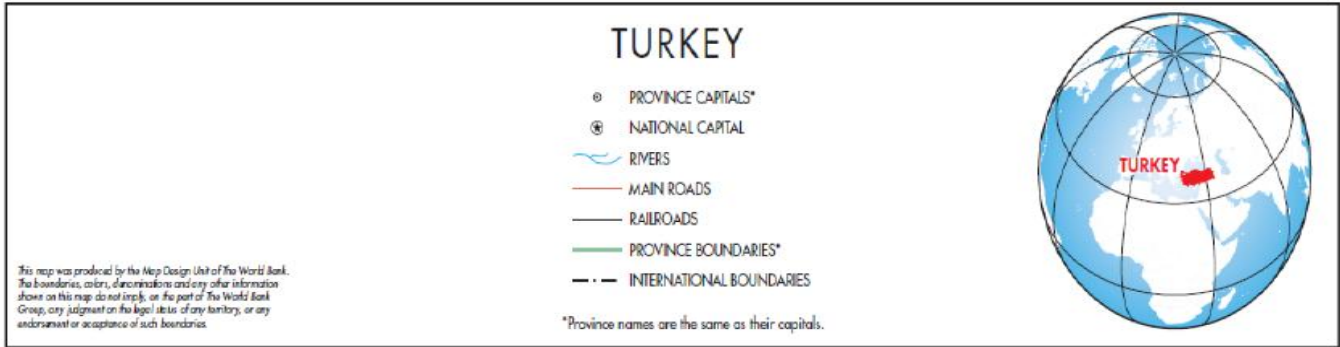


Figure 3 – Administrative Map of Türkiye

2.1. Economic Perspective of Türkiye

Türkiye is a large, middle-income country with relatively few natural resources. Its economy is currently in transition from a high degree of reliance on agriculture and heavy industry to a more diversified economy with an increasingly large and globalized services sector.

Coming out of a tradition of a state-directed economy that was relatively closed to the outside world, government policies began to open up the economy in the 1980s, leading to the signing of a customs union with the European Union in 1995. In the 1990s, Türkiye's economy suffered from a series of coalition governments with weak economic policies, leading to high-inflation boom-and-bust cycles that culminated in a severe banking and economic crisis in 2001, a deep economic downturn (GNP fell 9.5% in 2001), and an increase in unemployment.

Türkiye's economy recovered strongly from the 2001 recession thanks to good monetary and fiscal policies and structural economic reforms. These included improved fiscal and public financial management, social security reform, and a completely new framework for macroeconomic management, in which an independent central bank is responsible for inflation-targeting and the lira floats freely against other currencies. These reforms yielded spectacular results. GDP growth in the five years from 2003 to 2007 averaged nearly 7 percent and poverty fell from 27 percent to 17 percent. Türkiye's economy grew an average of 6.0% per year from 2002 through 2007--one of the highest sustained rates of growth in the world. During this period, inflation and interest rates fell significantly, the currency stabilized, and government debt declined to more supportable levels (39.5% of GDP in 2008). However, booming economic growth contributed to a growing current account deficit (5.6% of GDP or \$41.6 billion in 2008). Growth fell to 1.1% in 2008, and the economy contracted by 4.7% in 2009 due to the global economic slowdown and reduced exports. Growth picked up to 8.2% in 2010. Continued implementation of reforms, including tight fiscal policy, and securing independent Central Bank monetary policies is essential to sustain growth and stability.

Türkiye was hit hard by the global economic crisis in 2008-9 but demonstrated resilience. GDP fell by 4.8 percent in 2009. The concentration of exports in highly cyclical sectors and reliance on EU markets compounded the impact of the crisis. Low domestic savings and high energy imports made Türkiye's private sector a high

net importer of foreign capital; between 2004 and 2009 the current account deficit (CAD) averaged 4.7 percent of GDP. EU-defined general government debt which had fallen from 78 percent in 2001 to less than 40 percent in 2008 increased to 45.5 percent in 2009 (mainly due to a fall in GDP).

After years of low levels of foreign direct investment (FDI), Türkiye succeeded in attracting \$18.3 billion in net FDI in 2008. Global market conditions reduced foreign capital inflows in 2009, and ' attracted \$7.7 billion in net FDI in 2009. This amount was expected to fall to around \$5 billion in 2010. Due to a series of large privatizations, the stability fostered by the start of Türkiye's EU accession negotiations, strong and stable growth, and structural changes in the banking, retail, and telecommunications sectors contributed to the 2008 rise in foreign investment. Türkiye has taken steps to improve its investment climate through administrative streamlining, an end to foreign investment screening, and strengthened intellectual property legislation.

While Türkiye's long-term economic prospects are bright, the government is working to limit growth of its current account deficit, which almost doubled in 2010, reaching an alarming 9% of GDP.

Türkiye bounced back from the global economic downturn much faster than many other countries in the region. By the second quarter of 2009 the economy was already growing again. GDP grew by 8.9 percent in 2010 and 11 percent in the first quarter of 2011. Public debt has resumed its declining trend and was back down to 45 percent of GDP at end 2010. Looking ahead, Türkiye faces critical remaining challenges on the supply side, especially in the energy sector, taxation, labour markets, and investment climate areas, to promote sustained high growth while reducing the dependence on external financing. As the economy recovered, the twelve month rolling CAD rose to a high of US\$72.5 billion at the end of June 2011. Meanwhile, credit to the private sector increased from 31.8 percent of GDP in 2008 to 43.7 percent in 2010. The story of Türkiye's economic performance since 2011 has been one of remarkable turnaround and success.

2.2. Energy Perspective of Türkiye

In 2010, total electricity supply in Türkiye reached 194 terawatt-hours (TWh), up by 51% from 2000. Natural gas fuelled 49% of power generation, while coal provided 28%, hydropower 19%, oil 3%, and other sources 1%. Electricity demand in Türkiye continues at an annual growth rate of between 6.5% and 8% per year, which is higher than the average rate of GNP growth over the last few years. Combined with the lack of investment in the sector, this is mainly due to the Government of Türkiye's (GOT) control over prices and slow progress in market liberalization, increased concerns regarding electricity shortages. Official data indicated that Türkiye would face electricity shortages as of 2009; however, the GOT revised its projections after experiencing reductions in demand in late 2008, and, due to the global economic crisis and relatively mild weather, Türkiye was able to meet its demand. The Ministry of Energy declared a 4.5% annual growth in electricity demand in 2009, half the amount of demand growth in previous years. In 2008, the GOT passed new legislation to encourage investment in the sector, which introduces incentives for companies bringing their facilities online by 2012. Türkiye is currently undertaking privatization of its electricity distribution. The private sector has responded, adding 6,644 megawatts (MW) of electricity generation capacity since 2009.

In 2009, fossil fuels accounted for 89% of total primary energy supply (TPES) in Türkiye. Coal and natural gas each provided 31% of the total, and oil provided 27%, while renewable energy sources provided the remaining 11%. In 2011, on an energy basis, coal and lignite provided 31% of total final consumption, natural gas 31%, oil 27%, and renewable (biomass, hydro, and geothermal) 11%. Coal is the only energy source with significant domestic availability; over 90% of both oil and natural gas is imported. Domestic oil and gas production is mostly from small fields in the southeast, although major exploration projects are active in the Black Sea. TUPRAS, the largest refiner in Türkiye, was privatized in 2005. Türkiye has a refining capacity of 714,275 barrels per day (b/d).

Türkiye acts as an important link in the East-West Southern Energy Corridor bringing Caspian, Central Asian, and Middle Eastern energy to Europe and world markets. The Baku-Tbilisi-Ceyhan pipeline, which came online in July 2006, delivers up to 1 million barrels/day of petroleum, and in 2007, the South Caucasus Pipeline (from Shah Deniz) started bringing natural gas from Azerbaijan to Türkiye. Türkiye's

interconnector pipeline to Greece, an important step in bringing Caspian natural gas to Europe via Türkiye, came online in November 2007. In July 2009, Türkiye signed the Nabucco Intergovernmental Agreement, along with Austria, Bulgaria, Romania, and Hungary, which includes plans for a 2,000-mile natural gas pipeline running from Erzurum, Türkiye to Baumgarten, Austria with a 31 billion cubic meter capacity. Alternative proposals to Nabucco include the Trans-Adriatic Pipeline (TAP) and the Italy-Türkiye-Greece Interconnector.

2.3. Transport Choices of Türkiye

Türkiye's transportation sector plays a vital role across the entire economy, influencing all aspects of production, employment and regional development and permeates through to the everyday living conditions and quality of life of all citizens.

The EU is contributing major investment into Türkiye's rail network, roads, and public transport to develop a system that is more efficient, convenient and better value for money. This investment will also help Türkiye's transport system to link up better with the rest of Europe, allowing it to join the Trans-European Networks (TENs).

Apart from these dominating sectors, there are other basic branches offering production of either goods or services. The beverages and food sector is leading with beer, wine and foodstuffs production.

The mining sector is one, with the principal minerals of coal, iron, lead, chrome, aluminum, gold, silver, mercury, zinc, copper, bauxite and sulphur being extracted and processed. Industrial raw materials include asbestos and phosphate. Energy raw materials are coals, uranium, oil and geothermal sources.

Energy production (lumber and petroleum products) construction and transportation are other important areas, each continuing a steady progress.

2.4. Environment Perspective of Türkiye

With the establishment of the Environment Ministry in 1991, Türkiye began to make significant progress addressing its most pressing environmental problems. The most dramatic improvements were significant reductions of air pollution in Istanbul and Ankara. However, progress has been slow on the remaining--and serious--environmental challenges facing Türkiye.

In 2011 the Ministry of Environment and Forestry was split into the Ministry of Environment and Urbanization--and the Ministry of Forestry and Water Affairs. With its goal to join the EU, Türkiye has made commendable progress in updating and modernizing its environmental legislation. However, environmental concerns are not fully integrated into public decision-making and enforcement can be weak. Türkiye faces a backlog of environmental problems, requiring enormous outlays for infrastructure. The most pressing needs are for water treatment plants, wastewater treatment facilities, solid waste management, and conservation of biodiversity. The discovery of a number of chemical waste sites in 2006 has highlighted weakness in environmental law and oversight.

Türkiye signed the Kyoto Protocol in 2008 and ratified it in 2009. Türkiye will not be obligated to reduce its greenhouse emissions until 2012, when the agreement's second commitment period may go into force.

3. International Protocols & Agreements to fight Climate Change

Kyoto Protocol -2005

The collaborations are rising up to decrease the global reflection of climate change. The Kyoto Protocol was a driving force in this respect, and was an international agreement linked to the United Nations Framework Convention on Climate Change. The major feature of the Kyoto Protocol is that it set binding targets for 37 industrialized countries and the European Community for reducing greenhouse gas (GHG) emissions.

These amount to an average of five per cent against 1990 levels over the five-year period 2008-2012. The Kyoto Protocol was adopted in Kyoto, Japan, on 11 December 1997 and became legally binding for signatories on 16 February 2005.

Copenhagen Summit-2009

In December 2009, the UN Climate Change Conference in Copenhagen included the fifteenth Conference of the Parties (COP 15) to the United Nations Framework Convention on Climate Change (UNFCCC). The 'Copenhagen Accord' was drafted by the US, China, India, Brazil and South Africa.. The document recognized that climate change is one of the greatest challenges of the present day and that actions should be taken to keep any temperature increases to below 2°C.

The document is not legally binding and does not contain any legally binding commitments for reducing CO₂ emissions. Many countries and non-governmental organizations were opposed to this agreement, but as of 2010, 138 countries, including the UK, have signed the agreement.

EU 2020 Climate and Energy Package-2008

In December 2008, EU leaders and the European Parliament agreed a unilateral commitment to reducing greenhouse gas emissions by 20 percent (compared to 1990 emissions) by 2020. The EU has made a commitment to increase this target to 30 percent for the period beyond 2012 if there are comparable targets from other developed countries and adequate action by developing countries.

The package includes:

_ The EU Emissions Trading System (EU ETS) directive is the EU's main policy mechanism for reducing CO₂ emissions from energy intensive sectors. It will deliver two-thirds of the first 3 UK carbon budgets. This equates to 21% reduction by 2020 compared to the 2005 verified emissions baseline under the EU ETS.

_ A Greenhouse Gas Effort Sharing Decision sets targets for reductions in those sectors of member states' economies not covered by the EU ETS – in the most part residential and transport.

_ A Renewables Directive sets targets for each member state for the proportion of renewable energy generation by 2020. The EU has a 20% renewables target by 2020. The Renewables Directive also set every Member State a target of supplying 10% of transport fuel from renewable sources by 2020.

_ The Directive on the geological storage of CO₂ outlines a regulatory framework for the safe capture, transport and storage of carbon dioxide in the EU. Up to 300 million allowances from the new entrants reserve of the EU ETS will be used to support the demonstration of carbon capture and storage (CCS) and innovative renewable technologies. (Europe 2020 Report, 2010)

The EU Covenant of Mayors Initiative on Climate Change-2008

The European Union Covenant of Mayors (COM) Initiative on Climate Change was established in 2008. The initiative was championed at a regional level and all the North East Authorities are participating, voluntarily committing to go beyond set government targets on greenhouse gas reduction. By their commitment, Covenant signatories aim to meet and exceed the European Union 20% CO₂ reduction objective by 2020.

3.1. Türkiye's Position at Climate Change Fight

Türkiye has become a party to the United Nations Framework Convention on Climate Change (UNFCCC) in 2004 and to the Kyoto Protocol in 2009. In line with the requirements of the negotiations, United Nations Development Programme (UNDP) which cooperates with a number of government agencies, municipalities, private sector partners to integrate environmental and sustainable development principles into national and regional development policies and plans, assists and supports Türkiye's global efforts. According to National Climate Change Action Plan (NACCP) of Türkiye which is carried out through the agency of UNDP and published in 2011, reduction of greenhouse gases has the priority to ensure sustainable development in Türkiye. (Ministry of Environment and Urbanization, 2012)

Realizing and accepting the inevitability of climate change; experts have agreed that adaptation measures will be necessary in order to cope with its consequences. Such measures, if implemented in a timely manner, can not only reduce the risks and alleviate adverse impacts of climate change but also lessen the economic and human costs of future damages. Local authorities are ideally placed to tackle climate change as they are seen as a trusted source of information with the ability to engage with individuals, communities and businesses.

3.2. Laws and Regulations on Energy Efficiency in Türkiye

Energy Efficiency Law No. 5627

- Law No. 5836 of the United Nations Framework Convention on Climate Change Agreement to Kyoto Protocol
- Research and Development Projects in Energy Sector Support Program
- Procedures and Principles for Promotion of Energy Efficiency in Transportation
- Energy Performance of Buildings Directive
- Assignment of the Ministry of Education to the Schools Energy Manager
- Regulation on energy efficiency requirements for ballasts for fluorescent lighting
- Regulation on energy efficiency requirements for ballasts for fluorescent lighting- appendices
- Energy Performance of Buildings Directive
- Proof of institutions and organizations to Implement Energy Efficiency Services
- Communiqué on Energy Efficiency Training and Certification Activities
- Communiqué on Energy Efficiency Incentives
- Prime Minister's Circular Related to Energy Efficiency Year 2008
- 2008 Circular of the Ministry of Energy and Natural Resources Related to Energy Efficiency
- Circular on how to replace incandescent lamps in the public sector
- Energy Efficiency Strategy Paper 2012-2023
- Electricity Market and Supply Security Strategy Paper

4. Kadıköy District

Kadıköy, one of the districts of İstanbul, is located in the Asian part of Istanbul (Figure 4), facing the historical city center of the European side of Bosphorus. Population of Kadıköy is 521.005 (2012 census of population) and it has an area of 25.2 km². Kadıköy is the most prominent district of the Asian part of İstanbul, a residential and commercial area and also it is a cultural center with numerous cinemas, theaters and bookshops.



Figure 4 - Map of Kadıköy

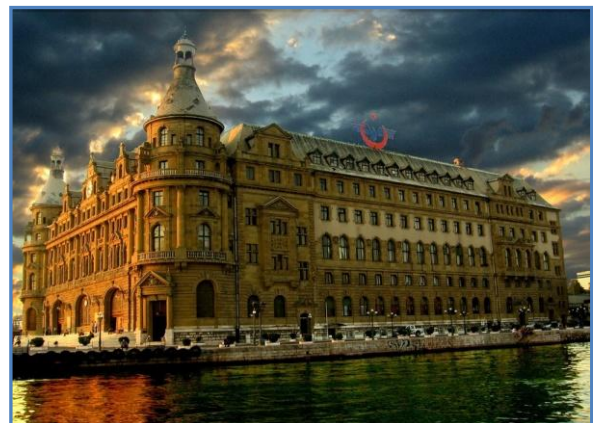
Kadıköy is known as one of the first built up areas of Istanbul, therefore population and building density of the region is quite high. It is constructed on six hills. Those hills are named Göztepe, Fikirtepe, Acıbadem, Altıyol, Cevizlik (Küçük Moda) and Koşuyolu. Kadıköy's coast line extends from Haydarpaşa to Bostancı and its length is 21 km long. Kadıköy district is divided into 21 neighbourhood units.



Picture 1 – A view of Kadıköy-Altıyol

4.1. Kadıköy's Economical Perspective

Kadıköy's economy is largely composed of the service sector. Industry, agricultural activities and livestock production are not observed in the region. Due to the high income level of its residents, unique designs of the construction sector implemented in the residential areas can be observed in the district. With its famous locations such as Bağdat Street, Historical Kadıköy Bazaar, Historical Haydarpaşa Train Station, various shopping malls and many other historical and touristic destinations, Kadıköy is one of the most important commercial centers in İstanbul. Furthermore there are three universities located in Kadıköy, and their existence benefits the economical structure of Kadıköy.



Picture 2 – Historic Kadıköy Bazaar & Haydarpaşa Rail Station

4.2. Kadıköy's Transportation

Kadıköy is situated like a doorway in the Anatolian Side of the Bosphorus, therefore the first thing that comes into mind in terms of transportation is sea transportation. There are two main ports, one located in Central Kadıköy and one in Bostancı and these ports provide transportation to all over the city.

There are two airports situated at each east and west ends of İstanbul and they are both approximately 40 km's away from Kadıköy center. Sabiha Gökçen, the one that is located on the east side is easier to reach from Kadıköy than the one in the European Side, Atatürk Airport.

In terms of inter-district transportation there are bus lines, minibus lines and taxis that have access to every part of the city.



Picture 3 – A view of Bostancı

4.3. Public Transport

In most of the routes that the public buses are operating, there are also minibuses and minibus taxis operating separately. Nine of the public bus routes operate within the borders of Kadıköy district whereas 109 of them have their first stops in Kadıköy district and travel to other districts in İstanbul.

TCDD

The Republic of Türkiye State Railways (TCDD) in Haydarpaşa and Gebze is a regular commuter service. Electric trains start their route from the Haydarpaşa Station and travel to various stations that are situated at the western parts of Anatolian Side.

IETT Tramway

The tram is a medium to refresh the nostalgic transportation services, Kadıköy Tramway is a representative route between central Kadıköy and Moda and it works as a ring. The length of the route is 2,6 km's long.



Picture 4 - Moda Nostalgic Street Railway

Metrobus

Metrobus system came into operation on March 2009. The Söğütlüçeşme Station which is located in Kadıköy is the starting point of the Metrobus route that connects Anatolian and European Sides of İstanbul. It is possible to travel to the far west point of İstanbul via Metrobus. There are 3 stations in total that are situated in Kadıköy including Söğütlüçeşme Station. A total of 8 kilometers of the line passes from Kadıköy.

Kadıköy-Kartal Subway

The subway came into operation in August 2012. The initial station is located in the central Kadıköy with 8 more stations located within the borders of the district. It allows for the residents living in the west side of Anatolian Side to have easy access via railways to central Kadıköy and to the ports.



Figure 5 - Subway Station Map

Marmaray

It is expected that the Marmaray Project will come into operation on 2014. It is similar to Eurotunnel under English Channel which will connect Asian and European continents under Bosphorus. It is expected that the majority of people that are using personal cars will start using Marmaray in order to cross between the continents and hopefully, it will bring about a significant relief on traffic congestion of Istanbul.

5. Kadıköy Municipality

Historically, Kadıköy Municipality was established in 1855 as Sehremaneti. After the foundation of Turkish Republic, , the district of Kadıköy is structured in 23 March 1930 and keep on as one of the districts of the Metropolitan Municipality since 1984.



Picture 5 – Kadıköy Municipality Building

5.1. Duty and Jurisdiction of Kadıköy Municipality

Duties and powers of the Kadıköy Municipality under 'Municipal Law' were determined in 2005. The following article describes the Council's duties and responsibilities.

Providing services of urban infrastructure such as development of the region, water and sewage system and transportation; geographical and urban data systems; environment and environmental health, cleaning and solid waste; security forces, fire brigades, emergency aid, relief services and ambulance; city traffic; funeral and cemetery services; forestry, parks and green areas; housing, cultural and artworks, tourism and presentation, youth and sporting activities; social services; marriage ceremonies, professional trainings for unemployed; services for the development of economy and commerce. The Greater City Municipalities and the municipalities having population more than 50.000 shall open shelters for women and children's protection.

Opening of kindergardens; maintenance and repair of school buildings belonging to the Government; procurement of all kinds of equipment/material for this purpose; opening and operation of health facilities; protection of cultural and natural resources and historical values; repair and maintenance of such places; reconstruction of those ruined same as original. In case of need, providing equipment and support to students and amateur sports clubs, arranging amateur sports matches, giving awards upon decision of municipal council to sportsmen who have been successful in matches performed home or abroad or who have received a degree in matches. Being engaged in food banking.

The municipalities may undertake other duties and services which are not delegated to the other public institutions and corporations by the laws.

The priority of services shall be determined according to the financial capacity of the municipality and the urgency of service.

The municipal services shall be rendered in the most appropriate manner at the places nearest to the citizens. It is a basic principle to adopt a procedure most suitable for the disabled and old people as well as for those in destitute and with limited income. The duties, responsibilities and powers of the municipality shall be limited to the municipal boundaries.

5.2. Kadıköy Municipality Service Categories

- ***Cultural Services***
 - Barış Manço Cultural Center
 - Halis Kurtça Cultural Center
 - Caddebostan Cultural Center
 - 19 Mayıs Cultural Center
 - Kozyatağı Cultural Center
 - Barış Manço Cultural Center
 - Barış Manço Museum
 - Süreyya Opera House



Picture 6- Süreyya Opera House

- **Health Services**

- Child Protective Mental Health Center
- Mammography & Women's Health Center
- Children's Oral & Dental Health Clinic
- Children's Health & Medicine Clinic
- Dr. Rana Beşe Health Clinic
- Dumlupınar Health Clinic



Picture 7 - Mammography & Women's Health Center

- **Education Services**

- Children's Learning Centers
- Bedri Rahmi Eyübođlu Research Center
- Cemal Süreyya Research Center
- Fazıl Hüsnü Dađlarca Research Center
 - Kemal Tahir Research Center
- Children's Art Center
- Kindergarden Services
 - Hasan Ali Yücel
 - İsmail Hakkı Tongu
 - Mevhibe İnönü

- **Libraries**

- Boutique Art Library
- People and the Children's Library
- Muhtar Özkaya Library
- Dumlupınar Library

- **Social Services**

- Audio Library for the Visually Impaired
- Disability Advisory and Solidarity Center
- Social Cooperative Development Center
- Family Advisory Center
- Accessible Business Center
- Neighborhood Volunteer Centers (in 21 neighborhoods)
- Educational and Social Support Center
- Koşuyolu Neighborhood House
- Sahrayıcedit Neighborhood House
- Home for Elderly
- Women Guesthouse
- Wedding Hall

- **Urban and Environmental Services**
 - Waste Management and Coordination Centre
 - Concrete and Ground Analysis Laboratory
 - Community-Based Disaster Management Center
 - Electric and Electronic Waste Management Center

- **Sports**
 - Kadıköy Youth and Sports Center

- **Kadıköy Green Areas (Parks and Recreational Areas)**

Table 1 - Green areas of the region (m²)

Green Areas	Area (m ²)
Green areas under Kadıköy Control	510.000
Green areas under Istanbul Metropolitan Municipality Control	800.180
TOTAL	1310.180



Picture 8– Göztepe Liberty Park

5.3. Kadıköy Municipality's Efforts Against Climate Change and Energy Efficiency Initiatives

5.3.1. Cities for Climate Protection

Kadıköy Municipality signed the intention document called "Cities for Climate Protection Campaign" which was coordinated by ICLEI (Local Governments for Sustainability) and REC (Regional Environmental Center). The purpose of this document was to tackle the climate change, provide energy and water efficiency, support renewable energy resources and show good intentions about sustainable city planning efforts.

Right after participating in this campaign, some strategic objectives were identified about the reduction of greenhouse gas emissions at district scale for the years 2010-2014 with "Kadıköy Municipality Corporate Strategic Plan" in order to tackle climate change.

5.3.2. "No Plastic Bag!" Campaign

Under the directives of the "Cities for Climate Change Campaign" that we participated as Kadıköy Municipality, there were some measures taken in order to limit the usage of plastic bags first with announcements and later with banning the plastic bag usage district-wide at the date of 01.03.2010. The decision was made by the Kadıköy Municipal Council on 07.12.2009. The main purpose of this action was to reduce carbon emissions district wide and make savings in energy sources.

In order to achieve these goals, the municipality came together with the manufacturers, voluntary groups, and non-governmental organizations in order to identify the habits of plastic bag usage in shopping malls, market places, grocery stores and the specific places that commercial activities are intense. Furthermore they identified the daily and monthly consumption levels of businesses.

At the beginning of the Campaign; The municipality came together with plastic manufacturers in order to share the process of the project. At the same time, the process was passed on to the voluntary groups and non-governmental organizations to gain support in the field for the upcoming events.

Starting with the regions that the commercial activities are intense, district wide legal notices were made for the businesses to change the plastic bags into environmental-friendly products.



Picture 9 - No Plastic Bag Campaign

During the Campaign; in order to encourage the people and to publicize the project, in the streets and squares with a busy pedestrian circulation, a total of 25,000 bags and brochures were distributed.

Simultaneously with the banning of plastic bags, in order to inhibit the plastic bag usage of the businesses that apply for a license newly, information was given to these businesses for them to use environmental friendly shopping bags in their workplaces. After they were opened for business, they were inspected by the municipality and made to transfer to environmental-friendly products.

With the support of local police, in weekly periods, there were inspections carried out for the market places and there were penalties given to those who continued to use plastic bags despite the notices and banning.

In the extent of the campaign that we held with the voluntary groups, there were informatory meetings were done in their service units. There were also trainings held “Waste Management and Environmental Education Project” in schools located in the district parallel to the campaign .

The main focus of the “No Plastic Bag!” campaign was to increase public awareness and generalize the usage of environmental friendly products. It helped reducing the carbon emissions by 3.331 tons in a yearly basis by changing the consumption habits of people, generalizing the usage of cloth shopping bags and nets, providing savings on non-renewable energy resources and deterring pollution.



Picture 10 - No Plastic Bag Campaign

The project also created awareness at a national level. The Ministry of Health published a notification to all local governments to make the usage of environmental bags compulsory. In a national scale with the issuing of “Market Places Regulations” in 2012, the usage of environmental friendly shopping bags were made compulsory starting from the date of 01.01.2014.

5.3.3. Corporate Greenhouse Gas Inventory Development Project

In line with the objectives that were set by the Corporate Strategic Plan, for the first time in Türkiye, Kadıköy Municipality as a local government partnering with the REC brought into life “The Calculation of Corporate Greenhouse Gas Emissions”. There were several projects made in order to create inventories about the greenhouse gas emissions at a corporate level. At the beginning of the project, there were some workshops held about the basics of greenhouse gas emission calculations named “The Relationship between Climate Change and the Local Governments” and “Corporate Greenhouse Gas Inventory Trainings”. With these workshops the base year, boundaries and extents that will be used in this project were determined.

Under the scope of this project, the consumption levels and the emission creating activities that our municipal is responsible from are determined with our project partner. Using the emission factors determined by IPCC (International Panel of Climate Change) and DECC (Department of Energy and Climate Change) it was calculated that the corporate greenhouse gas emissions of Kadıköy Municipality was 12817 tons CO₂ eq. Furthermore, these calculations were shared in an international database called “carbonn.org” where the climate change reports of the cities globally are hold.

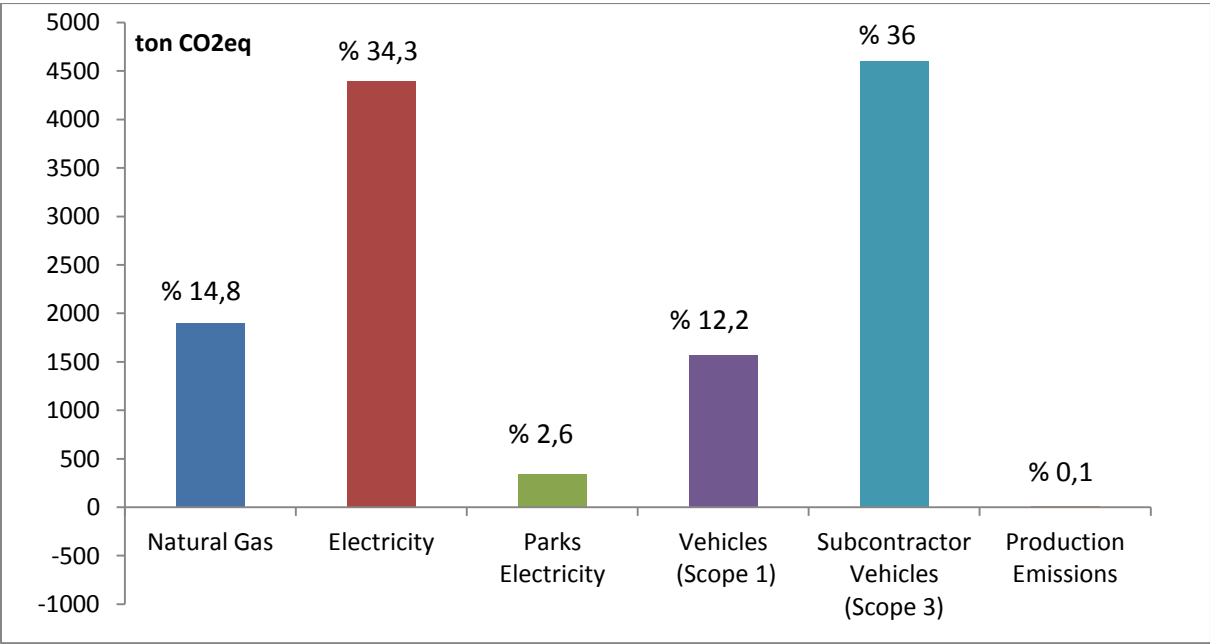


Figure 6 - Greenhouse Gas Emission of Kadıköy Municipality

After the calculations, the short and long term projects developed in a corporate scale for mitigating corporate greenhouse gas emissions gained momentum.

Due to the laws and regulations that were implemented in accordance with energy efficiency, starting from year 2010 an energy manager was assigned for the buildings of the municipality.

In year 2010 the highest rate of greenhouse gas emissions was caused by electricity consumption with a %34,3. In order to decrease the electricity consumption, “Building Energy Survey” and “Efficiency Improvement Projects” are prepared for the main

building. These projects have been implemented with the partnership of İstanbul Technical University Energy Institute. The aim of the projects was to calculate the shares of the yearly electricity consumption that was caused by lightning activity.

5.3.4. Electricity Efficiency Improvement Project (EEIP)

By examining the insulated and non-insulated condition of the main municipality building, the energy saving capacity was determined. Accordingly less fuel consumption and less emission due to fuel consumption was also identified. The aim was to become an example to all similar public buildings.

During the project, the energy saving points in our building were identified. The lightning fixtures' energy consumption in the building were calculated and was shown being responsible for approximately 30% of the energy consumption.

The lightning fixtures that were situated in the Mayor's Office of the municipality which were considered inefficient and problematic according to today's technology were replaced by LED fixtures.



Halogen Fixtures-50 watt



LED Fixtures- 5 watt

Picture 11 - Mayor's Office

The lighting fixtures that were used in offices, corridors and halls shared a 59% of the total electricity consumption. Therefore they were replaced due to not providing efficient and adequate lightning, which enabled for significant energy saving.

As a result of the project **EEIP 1**,

- In total installed capacity of lighting; 301.5 kW 180 kW reduced.
- 15-20% of the heat load has been eliminated thanks to LED light bulbs.
- offices provided a more comfortable working environment.
- Total annual savings = 128.506 kWh / year
- Amount of CO₂ reduction = 79,3 tonnes / year (249 days/year)

Project EEIP 2: Replacement Fan-coils on the fan motors, 2-way motorized valve (on-off control) and Room Thermostat Installation:

- 278 fan-coil cartridge filters, fan-coil fan motor 90, 84 fan-

The yield was increased by changing the coil thermostat devices.

- Total annual savings = 159,280 kWh / year
- CO₂ Reduction Amount = 36,9 tonnes CO₂ / year

Project EEIP 3: Cooling water temperature of 1°C increase output groups.

- Cooling water temperature 1°C increase output groups (the system water temperature of 7°C to 8°C, instead of sending) provide energy savings of 4% on an annual basis.
- Outline of the cooling group was restructured with a special insulated pipes.
- Total annual savings = 7510 kWh / year
- CO₂ Reduction Amount = 1,76 tonnes CO₂ / year

5.3.5. Zübeyde Hanım Wedding Hall & Municipality Building Outdoor Lighting Replacement to LED

Within the scope of energy efficiency project the lighting fixtures in the Municipality Service Building outdoor and Zübeyde Hanım Wedding Hall outdoor were replaced with LED fixtures. As a result of these efforts, the daily electricity consumption was

reduced to 6,5 kWh from 30 kWh on a daily basis. After the project was finished the CO₂ emissions were reduced by 45,3 tons annually.

5.3.6. Kadıköy Municipality Head Office Solar Collector

With the solar panels that were installed to the central municipal office, there was a project developed that could provide the warm water demanded by the municipal restaurant. The warm water demand of the restaurant was calculated as monthly 27 m³ tons and annually 327 m³ tons in the preliminary study surveys. Assuming that there would be the maximum efficiency provided by the solar collectors within 8 months, we calculated that there would be an energy saving of 5525,8 kWh in order to collect 216 m³ of warm water. This would allow for 3.7 tons of reduction in carbon dioxide emission.



Picture 12- Solar Collector on the roof of Kadıköy Municipality

5.3.7. Criteria Development for Sustainable Districts Project

“Determination of Ecology Sensitive Sustainable Settlement Criteria Project” was started for various reasons: To raise awareness for climate change, to replace the existing unorganized lifestyles of people with a lifestyle that have a corrective effect on ecological balance and to bring about environmental friendly construction consciousness.

The project was initially started for providing urban sustainability in Kadıköy. For this

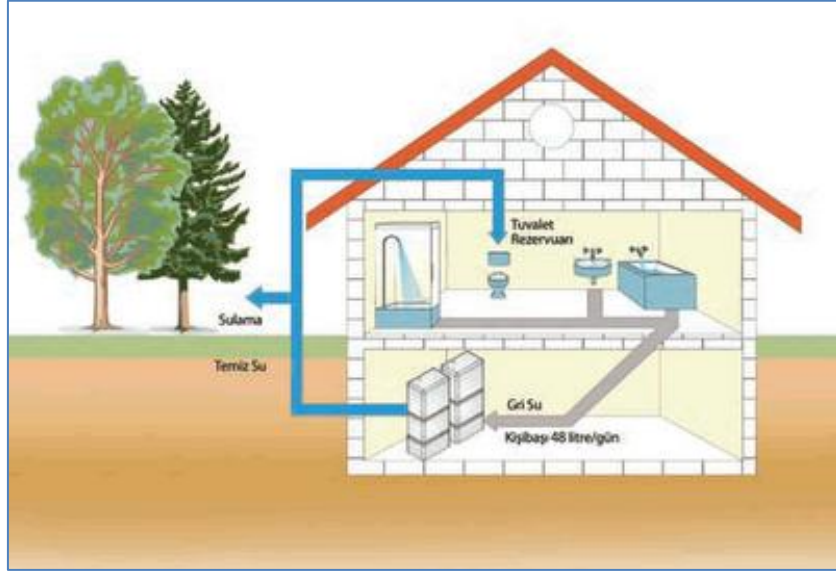
purpose, especially in urban renewal areas and for newly planned areas; the criterias for ecological planning were determined and these criterias were brought together in a “green planning guidebook” for our local.

This guidebook that contained the green building and green neighborhood criterias were shared with the delegates of construction sector, contractors, project teams and the relevant associations that are working active in our distict.



Picture 13 - Sustainable Green Neighborhood

In the scope of this project; It was applied in the Fikirtepe Urban Transformation zone that if there were more than 200 flats in a parcel, the recycling of grey waters were compulsory. Likewise, for office buildings that are greater than 10.000 m² the same rules were applied. The decision was taken in the city council on 11.09.2012 and came into act.



Picture 14 - Gray Water Treatment System

5.3.8. Municipality's Service Vehicles Transformation to Electrical Vehicles

Within the scope of energy efficiency attempts, there was a project formed to replace the old vehicles that belonged to municipality with environmental friendly ones. In year 2012, 4 of the 24 vehicles were replaced with the electric vehicles with low emission levels. In 2013 this number came up to 15. For the total of 15 cars, it is anticipated that there will be an annual 87 tons of CO₂ emissions reduction.



Picture 15 - Electric Vehicles

Five of the garbage collection vehicles with mini open dampers that were used in narrow historical locations like the Historical Market were changed into electric vehicles in year 2013. It is anticipated that there will be a CO₂ emissions reduction of 33,3 tons annually.

In 2013 May, 10 brand new electrical garbage collection vehicles with hydraulic compressions came into operation. It was anticipated that this would both help with the environmental noise problems and It would reduce the CO₂ emissions annually on average by 237,7 tons.



Picture 16 - Electric Garbage Truck

5.3.9. Covenant of Mayors Agreement of Municipality

The vision of the Kadıköy Municipality is a healthy environment, a good life quality and energy efficiency. In accordance with this, the projects that are held in order to tackle with climate change and increase energy efficiency are continuing at an increasing rate district wide.

To reach our goals, on July 2012, Kadıköy Municipality signed the “Covenant of Mayors” which was formed within the scope of European Commission. The covenant was signed by the directors of thousands of local governments internationally. This covenant attempts to decrease the greenhouse gas emissions by at least 20% until year 2020.

Within the scope of “Covenant of Mayors” Kadıköy Municipality worked in cooperation with “Boğaziçi University Sustainable Development and Clean Production Center” in order to create its Sustainable Energy Action Plan.

Before starting to work in Sustainable Energy Action Plan, Climate Change and Energy Efficiency Platform was constituted, the scheme of the platform is given below.

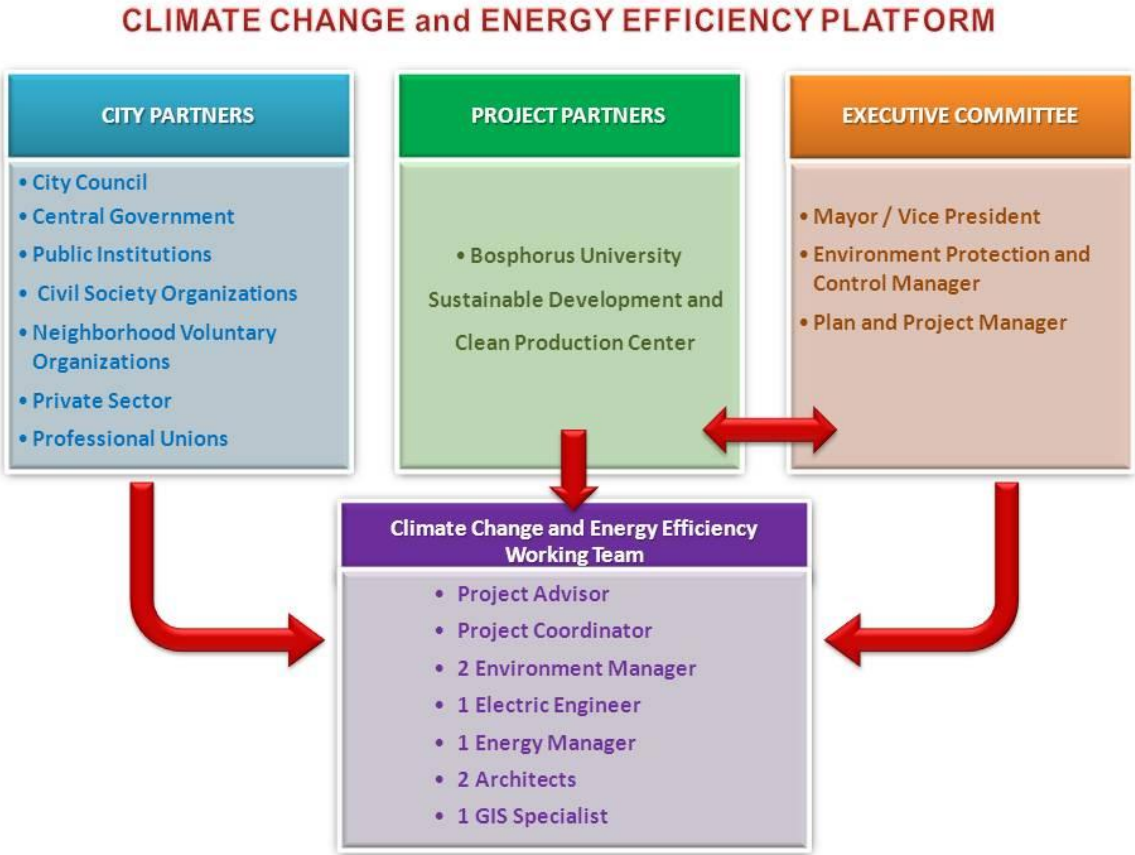


Figure 7- Climate Change and Energy Efficiency Platform

6. Methodology

6.1. Defining the Methodology

While developing the SEAP the principals used consistent with those used in the finance sector, to ensure accurate accounting and reporting. These principles have previously been adapted by the WRI/WBCSD GHG Protocol Initiative to apply to the accounting and reporting of greenhouse gas emissions. There were few numbers of defined methodology for developing SEAP. The most convenient for the region of Türkiye is chosen IEAP which is generated by ICLEI.

While reporting some indicators needed to be certain from the beginning, therefore here we are declaring that at all stages of preparation, this long-term targeted goal international principals are considered which are outlined below.

Relevance: The greenhouse gas inventory shall appropriately reflect the greenhouse gas emissions of the local government or the community within the local government area and should be organized to reflect the areas over which local governments exert control and hold responsibility in order to serve the decision-making needs of users.

Completeness: All greenhouse gas emission sources and activities within the chosen inventory boundary shall be accounted for. Any specific exclusion should be disclosed.

Consistency: Consistent methodologies to allow for meaningful comparisons of emissions over time shall be used. Any changes to the data, inventory boundary, methods, or any relevant factors in the time series, shall be disclosed.

Transparency: All relevant issues shall be addressed in a factual and coherent manner to provide a clear audit trail, should auditing be required. Any relevant assumptions shall be disclosed and include appropriate references to the accounting calculation methodologies and data sources used, which may include this Protocol and any relevant Supplements.

Accuracy: The quantification of greenhouse gas emissions should not be systematically over or under the actual emissions. Accuracy should be sufficient to enable users to make decisions with reasonable assurance as to the integrity of the reported information. (GHG Protocol, 2010)

After deciding the methodology, the initial step is effectuating the Baseline Emission Inventory of the district. In order to calculate the greenhouse gas emission of a region the individual gases can be converted to carbon dioxide equivalent (CO₂e) in order to calculate a single number that represents the total amount of greenhouse gas being released. The explanation of this process is expressed in IPCC guidelines effectively.

Carbon dioxide equivalent (CO₂e) : *It is the standard unit that allows amounts of greenhouse gases of different strengths to be added together based on each gas's impact on climate change. CO₂e is expressed in terms of the amount of carbon dioxide it would take to have the same impact on global climate change. For example, nitrous oxide is 310 times more potent than carbon dioxide as a global warming gas. Therefore, one unit of N₂O is equivalent to 310 units CO₂e. This conversion factor is the gas's Global Warming Potential. The global warming potential is calculated based on a specific time frame (most commonly 100 years), taking into consideration both the impact and the length of time the gas remains in the atmosphere (i.e. a more potent greenhouse gas that is removed from the atmosphere in 10 years could have a lower global warming potential than a weaker gas that remains in the atmosphere for 50 years).* (IEAP, 2009)

The most important step towards the development of the SEAP is the compilation of a Baseline Emission Inventory. This inventory should depict the situation concerning the CO₂ emissions inside the territory of the Covenant signatory at a "baseline" year. (SEAP guidelines, 2013) Therefore, the first workload of the area is generating the "Carbon Foot Print" of the district.

Greenhouse gas emissions amount released from a region is a good source in order to predict possible outcomes of that region upcoming years. In order to describe and exemplify the effects of CO₂ in the world, the term called "Carbon Foot Printing" is created. It is explained by UK Carbon Trust as "the total set of greenhouse gas (GHG) emissions caused by an organization, event, product or person". Moreover, there are different and a complementary definition therefore below there is a table that displays institutions approach towards the issue.

Table 2 - Definitions of 'Carbon Footprint' from the Grey literature

Source	Definition
BP (2007)	"The carbon footprint is the amount of carbon dioxide emitted due to your daily activities – from washing a load of laundry to driving a carload of kids to school."
British Sky Broadcasting (Sky) (Patel 2006)	The carbon footprint was calculated by "measuring the CO ₂ equivalent emissions from its premises, company-owned vehicles, business travel and waste to landfill." (Patel 2006)
Carbon Trust (2007)	"... a methodology to estimate the total emission of greenhouse gases (GHG) in carbon equivalents from a product across its life cycle from the production of raw material used in its manufacture, to disposal of the finished product (excluding in-use emissions). (CarbonTrust 2007, p.4)
Energetics (2007)	"... the full extent of direct and indirect CO ₂ emissions caused by your business activities."
ETAP (2007)	"...the 'Carbon Footprint' is a measure of the impact human activities have on the environment in terms of the amount of greenhouse gases produced, measured in tonnes of carbon dioxide."
Global Footprint Network (2007)	"The demand on bio capacity required to sequester (through photosynthesis) the carbon dioxide (CO ₂) emissions from fossil fuel combustion."
Grub & Ellis (2007)	"is a measure of the amount of carbon dioxide emitted through the combustion of fossil fuels. In the case of a business organization, it is the amount of CO ₂ emitted either directly or indirectly as a result of its everyday operations. It also might reflect the fossil energy represented in a product or commodity reaching market."
Parliamentary Office of Science and Technology (POST 2006)	"A 'carbon footprint' is the total amount of CO ₂ and other greenhouse gases, emitted over the full life cycle of a process or product. It is expressed as grams of CO ₂ equivalent per kilowatt hour of generation (gCO ₂ eq/kWh), which accounts for the different global warming effects of other greenhouse gases."

According to the methodology determined by the local government and advisory party, the boundary of the region is structured. This study helps to entity or organization to face up their potential challenges. There are two approaches to display the boundaries of a district under calculation of the greenhouse gas emissions.

First is organizational boundary and it consists of functions directly under local government control, consistent with private sector reporting. In cases where certain functions are shared, a proportional share approach may be needed. Secondly, geopolitical boundary it includes of the physical area or region over which a local government has jurisdictional authority. (GHG Protocol, 2010) For the municipality those factors are decided by the “Climate Change and Energy Efficiency Control Unit”. The boundaries are structured based on the district.

After the decision given through the authorities of the municipality, the calculation of baseline emission inventory for year 2010 has been conducted. The base year has been chosen due to accurate data reasons.

By agreeing the Covenant of Mayors, municipality promise to decrease the level of carbon emissions per person by 20% by 2020, from the baseline year 2005. The carbon emission per person for year 2010 was structured by expressing the methodology of ICLEI and the rate of carbon emission per person was calculated by considering the municipality emission sources owned or operated by the Kadıköy Municipality. In other words, the emission which he is responsible for and have a control on in order to take action and decrease it at least 20% by 2020.

According to ICLEI’s methodology there are three defined area to carve out an appropriate and reliable inventory. In the report International Local Government GHG Emissions Analysis Protocol (IEAP) the classification in order to generate targets of mitigation has been done clearly. The sections are listed below.

SCOPE 1 EMISSIONS – Direct emission sources owned or operated by the local government.

SCOPE 2 EMISSIONS – Indirect emission sources limited to electricity, district heating, steam and cooling consumption.

SCOPE 3 EMISSIONS – All other indirect and embodied emissions over which the local government exerts significant control or influence.

6.2. Baseline Emission Inventory

Collection of Data

Istanbul is a metropolis with population 17 million. Kadıköy Municipality represents the 524.373 (2010 pop. census) citizens living in Asian side of İstanbul. Although Kadıköy Municipality is the local authority of the 25 km², districts' main sources are represented and controlled by the Istanbul Metropolitan Municipality. To illustrate, city's transportation network is controlled by Istanbul Metropolitan Municipality. Therefore, while calculating the borough's CO₂ emissions we made some assumptions.

Under the ICLEI's methodology boundaries of the borough has been set up. Hereunder, direct and indirect emissions of the municipality has been defined.

Table 3 - The division of Scopes

Scope 1
Municipality Buildings Natural Gas Consumption
Residential Buildings Natural Gas Consumption
Residential Buildings Coal Consumption
Municipality Fleet

Scope 2
Municipality Buildings Electricity Consumption
Municipality Company's Electricity Consumption
Parks
Residential Electricity Consumption

Scope 3
Municipality Employee's Service Transportation Fuel Consumptions
Municipality Outsourcing Fuel Consumptions
Garbage Trucks Consumption
Packaging Waste Collector Truck Fuel Consumption

Municipality of Kadıköy's reduction targets towards 2020 are set by considering these activities' carbon emissions.

- In order to calculate the reliable carbon emission inventory of the district the year 2010 is chosen as a base year.
- Data are taken from several sources. For the building sector the data has been gathered from Municipality own database called UKBS (Borough Info System) The necessary info regarding to construct a plan is gathered. Also, while calculating the municipality emissions again the same source has been used.
- Electricity consumption rates of the region has been given by the local stakeholder AYEDAŞ (the entity which distributes electricity of the region)
- Natural gas consumption which is used in many areas like electricity, (heating, cooking etc.) rate for the year 2010 has been taken by one another stakeholder İGDAŞ.
- In the region for heating purposes, the natural gas is used widely. However, with the data taken from District Government at the beginning of the year that they dispersed 2000 tonnes of Coal to the locals of Kadıköy. Therefore, in the calculation of Scope 1- Residential Coal Consumption, this data has been considered.
- Tertiary buildings contain hospitals, universities, schools, office buildings etc. Also, it is need to point out that the industrial activity in the region is restricted to office buildings, so emission has been added to Tertiary sector.
- For the fuel consumption of fleet of the municipality data has been taken from its own database.
- Public transportation data are taken from several sources. First, for the minivans which are in service of high number of citizens, a short but well-defined data survey has been created and with the help of the municipality employee survey forms have been filled by minivans drivers. Secondly, fuel consumption from other vehicles have taken from the authorized entity Istanbul Metropolitan Municipality (IMM). Moreover, the control of the public

transportation is handled by IMM also. For that reason whilst of defining the measurements we have to omit the public transportation related emissions.

- Public lightings are also under jurisdiction of the IMM, so it has been shown in the report, but it was not included to the mitigation plan. Only park lightings are under jurisdiction of Kadıköy Municipality, their electricity consumption has been integrated to the carbon emission inventory.
- Whilst the reduction targets have been taken for the borough, public transportation and personal cars emission releases are not taken into account. In the case of reducing the district's transportation carbon emission rate, we did not consider the public transportation because as municipality we do not have control over transportation network to adjust in order to reach the 2020 goals.

Although under Kadıköy mitigation plans Scopes 1, 2, 3 are considered, in order to have a clear vision for future Kadıköy's carbon management all sectors included calculation also studied and be pointed in this report.

7. Results

7.1. CO₂ Emissions of Kadıköy

In 2010 Kadıköy District consumed 4 million MWh of primary energy. In the process the district emits approximately 2.53 million tonnes of the greenhouse gas CO₂ equivalent which represents approximately 4.83 tonnes CO₂/capita/year.

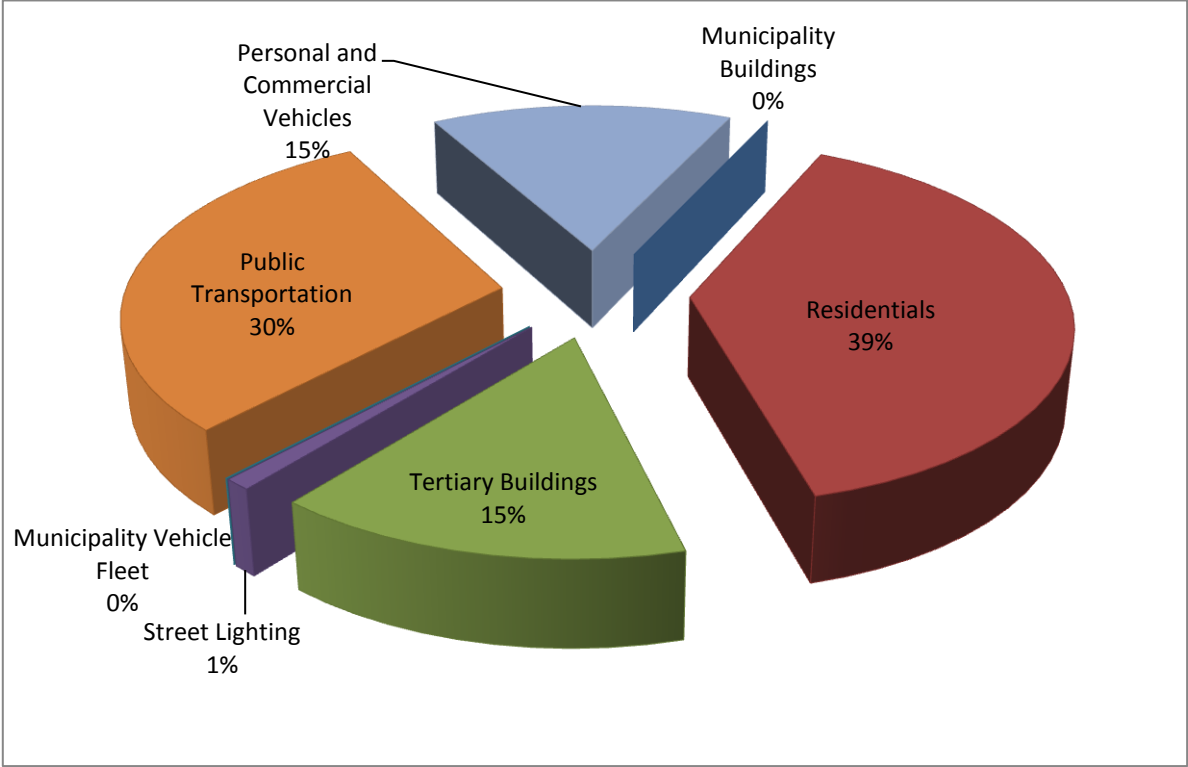


Figure 8 - Total Emission of the Kadıköy District

Total Energy Consumption (2010)

Table 4 - Total Energy Consumption of the Kadıköy District

2010	Electricity Consumption (MWh)	Natural Gas Consumption (MWh)	Coal Consumption (MWh)	TOTAL (MWh)
Municipality Buildings & Parks	7.208,3	7.702,3		14.910,6
Residential	643.126,0	2.511.936	16	3.155.078
Tertiary Buildings (universities, hospitals etc.)	478.340,3	366.859,8		845.200,05
Street Lighting	18.749,0			18.749
TOTAL				4.033.938

As it is displayed in above table most of the consumption arouses from residential sector. It is almost 39% of the total consumption. While taking the action towards decreasing the region's emission rate, building renovation is needed to highlight.

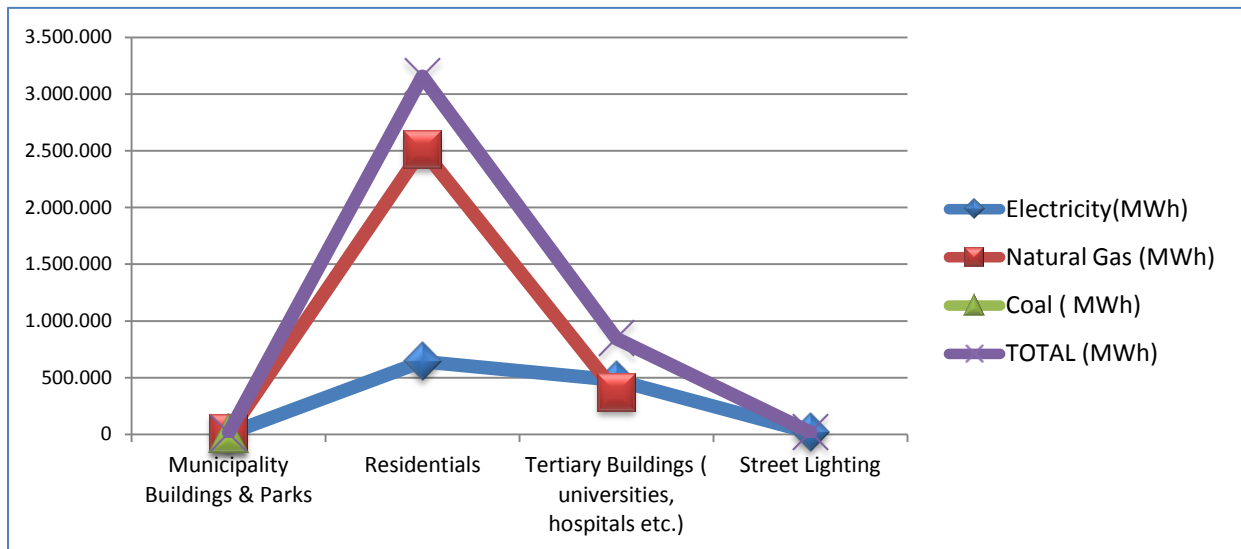


Figure 9 - Total Energy Consumption of the Kadıköy District

This diagram is another way to express the effects of the sectors in the district. Coal has almost zero contribution to the total picture of emission release from the district of Kadıköy. Besides that, tertiary buildings and housings are key indicators to create an efficient carbon management in the district. Also, in this table we can observe the consumption coming from different energy sources. It looks like that natural gas is the first choice of the citizens for multi-purpose activities. It is followed by electricity. Especially in housing its consumption at year 2010 reaches to over 3 million MWh.

Total CO₂e Emission (in tons)

Table 5 - Total CO₂e Emission of the Kadıköy District

2010	TOTAL ton CO ₂ -e
Municipality Buildings & Parks	6250,0
Residential Buildings	991.651,7
Tertiary Buildings	380.981,1
Street Lighting	11.568,2
Municipality Vehicle Fleet	6171,0
Public Transportation	763.250,5
Personal and Commercial Vehicles	375.576,0
TOTAL	2.535.448,5

Kadıköy's per capita CO₂ emission for baseline year 2010 is 4,83 (public transportation and personal car fuel consumption is included) And total emission is almost 2.53 million tonnes of CO₂e. As it is displayed in the total energy consumption table the highest rate of emission is caused by residential, it is followed by public transportation.

7.2. Kadıköy Municipalities' Carbon Emissions

In this part of the report the emissions which are under control of the municipality has been explained. According the methodology chosen in order to prepare this report, the classification of the emission sources has been extracted. And the results of the calculation are summarized.

Table 6- Scope 1 CO₂ Emissions

Scope 1	CO₂ Emission (in tonnes)
Municipality Buildings Natural Gas Consumption	1.802,0
Residential Buildings Natural Gas Consumption	587.793,0
Residential Buildings Coal Consumption	7.050,1
Municipality Fleet	1.589,0
TOTAL	598.234,1

Table 7 - Scope 2 CO₂ Emissions

Scope 2	CO₂ e Emission (in tonnes)
Municipality Buildings Electricity Consumption	3481,0
Municipality Company's Electricity Consumption	423,8
Parks	542,0
Residential Buildings Electricity Consumption	396.809,0
TOTAL	401.255,8

Table 8- Scope 3 CO₂ Emissions

Scope 3	CO ₂ e Emission (in tonnes)
Municipality Employee's Service Transportation Fuel Consumptions	136,0
Garbage Trucks Consumption	4.368,3
Packaging Waste Collector Truck Fuel Consumption	213,3
TOTAL	4.717,6

Table 9 - The amount of CO₂ that Kadıköy is Responsible for.

SCOPE	CO ₂ e Emission (in tonnes)	%
Scope 1	598.234,1	% 60
Scope 2	401.255,8	% 40
Scope 3	4717,6	% 0
TOTAL	1.004.207,5	%100

In this case Kadıköy Municipality is responsible for 1 million tonnes carbon emissions and target of % 21 reduction will achieve in this amount within. (*Population of Kadıköy is 524.373, in 2010*)

Table 10 - Total CO₂e / per capita Emissions in Kadıköy District

CO ₂ e Emissions-Ton CO ₂ e/per person	
KADIKÖY	1,91
ISTANBUL	3,33
TÜRKİYE	5,6

Workshop towards 2020

In order to share the result of the calculation of CO₂e emission of the district, a workshop has been organized on 10th of May, 2013. The stakeholders of the region and the potential contributors to the action plan has been invited. There was a high attendance from different parties. The group was colorful with academicians, public sector representatives, private sector representatives and volunteers. After the brief introductory presentations of the project, representatives from different parties came together to share their knowledge and experiences in the concept of sustainable cities. Four different headlines are defined by project team which are building isolation systems, renewable energy applications, transportation alternatives, awareness and training concept for sustainable cities. According to those titles, participators are motivated to find solutions or possible way-outs to decrease the emissions of the Kadıköy district. Some of the outcomes of this fruitful workshop are included to this report.



Picture 17 – Workshop, 10 May 2013

8. Measures to Reduce CO₂ Emissions

If no measurement taken during the process with the population growth rate 1.3% (Marmara Belediyeler Birliđi, 2013) the projection between the years 2010 and 2020 has been calculated .

When everything stays same on all sectors with the population growth rate 1.3%, in 2020 regions' CO₂ emission is expected to 1150 ktCO₂e. It is almost ten times more than baseline emission year inventory amount. As it is known the basic objective of all global initiatives is to decrease the level of GHG emission to 1990s levels.

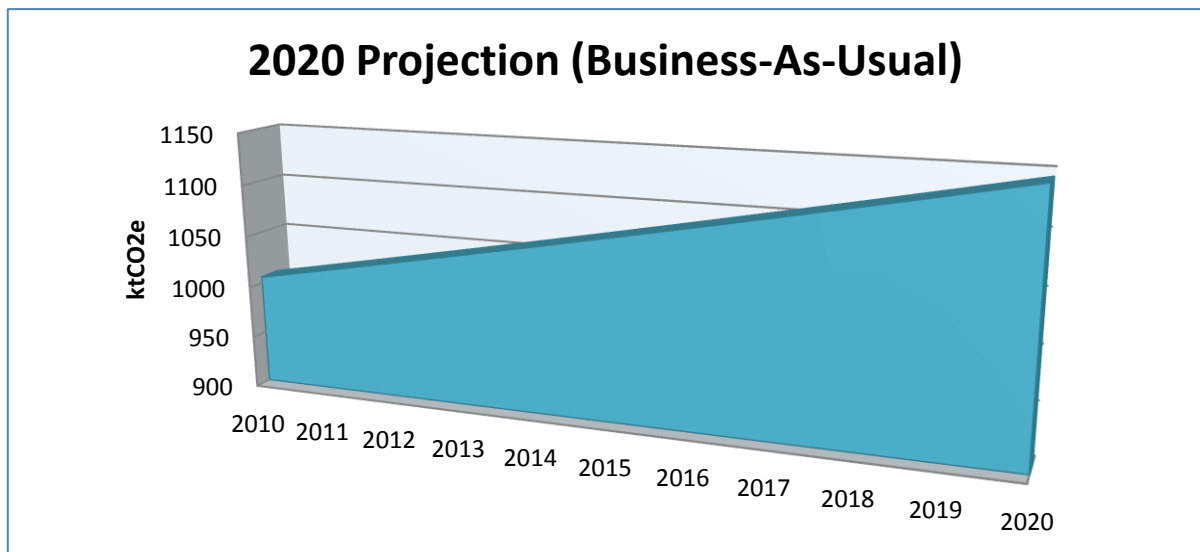


Figure 10 - 2020 Projection of CO₂ emission

The calculation of 2020 levels of Kadıköy district divided by each sectors is an effective diagram to observe the consequences of daily activities that we still continue to act. As Kadıköy is more like living area of Istanbul, its density on building is quite high. When we proceed to year 2020, the dwellings are still representing the biggest portion of CO₂ emission of the district. The second place is occupied by public transportation with the expected population over 600.000 at 2020. Municipality owned emissions are not in big amounts like public transportation or residential, therefore its position in 2020 are not easily seen at below figure.

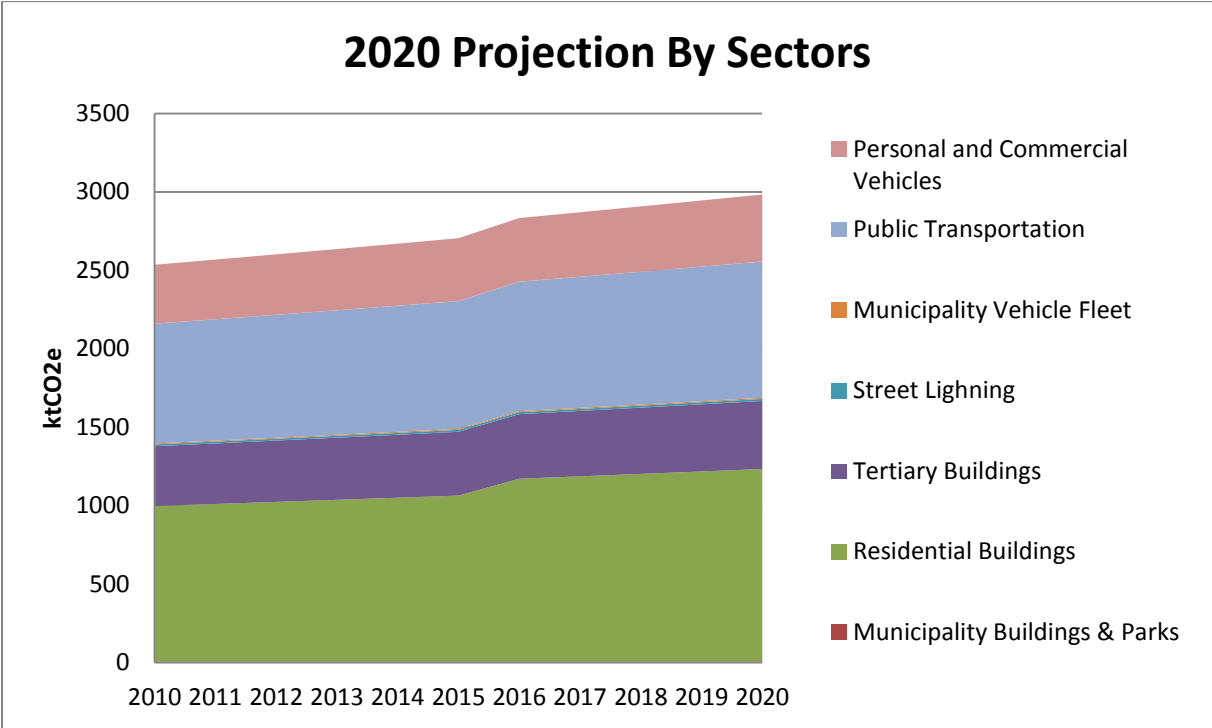


Figure 11 - 2020 Projection by Sectors

Within the enlightenment of this projection the measurements to decrease per capita emissions of the district has been generated by the municipality’s department of Climate Change and Energy Efficiency.

9. Emission Reduction Project

9.1. Lighting Oriented Projects

Project Name	Efficient Lighting Project for Recreation Areas
Project Description	Outdoor lighting fixtures in 38 Parks of Kadıköy Municipality will be changed into LED fixtures. The annual 464280kWh KWh electricity consumption is planned to decrease to 118785,6 KWh.
Project Benefits	<i>Electricity Reduction Target:345.494,4 KWh</i> <i>Carbon Emission Reduction Target: 213,2 tonnes CO₂</i>
Funding	Project Cost : 103.500 €
Funding Resources	Municipality Budget
Roadmap to reach the target	Starting from the Kalamış Atatürk Park, in all the recreation areas, lighting fixtures will be changed with LED fixtures.
Measuring	Annual update of carbon emissions baseline

9.2. Electrical Vehicle Concept Projects

Project Name	Electrical Car Charging Stations
Project Description	Several charging stations will be set up in the district. The aim of this activity is to draw the attention to electric cars, so to decrease the fuel consumption in public transportation and personal used cars.
Project Benefits	<p>Financial Savings:</p> <ul style="list-style-type: none"> According to the recent studies in per mile (1,60 km) electrical vehicles saves 0,12 dollar, so for a year 75 \$ saving occurs for one car. <p><i>Carbon Emission Reduction Target: up to 44 tonnes CO₂</i></p> <ul style="list-style-type: none"> Through assumptions, if 10 average fossil fuel cars pulled back from traffic and renewed with new ones average savings is calculated as above. (Savings from fossil fuel consumption) It is assumed that a typical car makes 1000 km/ per year (short-distance voyages)
Funding	<p>Project Cost :</p> <ul style="list-style-type: none"> One average residential type electrical charging cost is 1200 € For this project 10 charging station is planned to set up Total Cost: 12000 €
Funding Resources	Municipality Budget , sponsors
Roadmap to reach the target	Starting from the electrical cars and electrically equipped waste collection trucks, transformation to energy efficient vehicles will be achieved.
Measuring	Annual update of carbon emissions baseline
Notes	Approx. 750 employee of the municipality use their own car to reach to their offices. They mostly own diesel cars. For the 2020 targets, motivating the staff to use electrical cars by providing free charging stations nearby is a solution to decrease the level of greenhouse gas emissions.

Project Name	Transformation of municipality's Service Vehicles to Electrical Vehicles
Project Description	Altering 24 service vehicles with Electrical Vehicles
Project Benefits	Financial Savings: 64.300 € (annually) <i>Carbon Emission Reduction Target: 1670 tonnes CO₂</i>
Funding	160.000 €
Funding Resources	Municipality Budget
Roadmap to reach the target	According to the efficiency of the project, it will be an obligation to use electric cars for the municipality contractors.
Measuring	Annual update of carbon emissions baseline

Project Name	Collection of Waste with Hybrid Vehicles
Project Description	Hybrid cars will be added to the fleet
Project Benefits	<i>Carbon Emission Reduction Target: 271,3 tonnes CO₂</i>
Funding	95.000 € / per truck
Funding Resources	The subcontractors are obliged to change their waste collection trucks with the electrical ones.
Roadmap to reach the target	On monthly basis, consumptions and savings will be measured and saving rates will be determined.
Measuring	Annual update of carbon emissions baseline

9.3. Renewable Energy Projects

Project Name	Kadıköy Youth and Sports Center Solar Panel Application
Project Description	Increasing the renewable energy sources in the Social Establishment building
Project Benefits	Financial Savings: 10.800 € /per year (based on average energy costs) <i>Carbon Emission Reduction Target: 54,4 tonnes CO₂</i> Saving 88,2 Mwh/ per year
Funding	Project Cost : 127.000 €
Funding Resources	Municipality Budget
Roadmap to reach the target:	Solar panel applications of the municipality buildings will be an example to private sector.
Measuring	Annual update of carbon emissions baseline
Notes	The efficiency rate of the Solar panels are quiet high, however their economic life is approxiametly 25 years

Project Name	Kalamış Atatürk Park Solar Panel Application
Project Description	Solar panels will be set up to the eight LED lighting poles (Energy Source: Solar Panels)
Project Benefits	Financial Savings: 700 € / per year <i>Carbon Emission Reduction Target: 3,5 tonnes CO₂</i>
Funding	Project Cost : 12.000 €
Funding Resources	Municipality Budget
Roadmap to reach the target	Solar panel applications for outdoor functions of the municipality will be an example to private sector.
Measuring	Annual update of carbon emissions baseline

Project Name	Zübeyde Hanım –Wedding Hall Solar Panel Application
Project Description	Increasing the renewable energy sources in the municipality buildings.
Project Benefits	Financial Savings: 11.000 € /per year (based on average energy costs) <i>Carbon Emission Reduction Target: 54,4 tonnes CO₂</i> Saving 88,2 MWh/ per year
Funding	Project Cost : 134.000 €
Funding Resources	Municipality Budget
Roadmap to reach the target	Solar panel applications of the municipality buildings will be an example to private sector.
Measuring	Annual update of carbon emissions baseline
Notes	The efficiency rate of the Solar panels are quiet high, however their economic life is approximately 25 years

Project Name	Renewable Energy for Buildings
Project Description	Until 2020, %30 of the apartment buildings (3200 buildings) that will be constructed newly will use renewable energy (solar panels) for the lighting of the stairs and the entrance of the building.
Project Benefits	<i>Carbon Emission Reduction Target: 426,48 tonnes CO₂</i> Saving 691,2 MWh
Funding	Project Cost: 16 million €
Funding Resources	All parties (government, citizens etc.) are involved to the process.
Roadmap to reach the target	Decision will be taken by the Kadıköy Municipality council and the solar panel application projects will be added to the plans and architectural designs of the buildings.
Measuring	

9.4. Buildings Oriented Projects

Project Name	Existing Buildings Reconstruction
Project Description	
Project Benefits	<p>Financial Savings: 18,6 million €</p> <p><i>Carbon Emission Reduction Target: 128.000 tonnes CO₂</i></p> <p><i>% 12 reduction from total CO₂e</i></p>
Funding	Project Cost : ~ 85 million € (estimated)
Funding Resources	All parties (government, citizens etc.) are involved to the process.
Roadmap to reach the target	Stakeholders involvement to the process is the key. Contractors and government agencies collaboration creates the necessary environment to renovation.
Measuring	Annual update of carbon emissions baseline
Notes	28.885 building are already existing in the district. Energy saving that is provided from 10.659 buildings in the region is 546968,4 (MWh). They are all expected to be rebuilt till 2020. When they are all renewed %55 of energy saving is provided. It is equal to close 128.000 tonnes of CO ₂ e. % 36 of buildings stock of the region has considered to be rebuilt.

Project Name	Buildings Insulation
Project Description	Within the scope of the “Buildings Energy Efficiency Directives” of the Türkiye, all buildings have to be renovated and insulated. Under these circumstances almost 50 % of the building stock of the borough (includes residential and tertiary buildings) are supposed to be in the project concept.
Project Benefits	<i>Carbon Emission Reduction Target: 68350 tonnes CO₂</i> <i>7 % reduction from total CO₂e</i>
Funding	Project Cost : ~100 million € (estimated)
Funding Resources	All parties (government, citizens etc.) are involved to the process.
Roadmap to reach the target	Stakeholders involvement to the process is the key. Contractors and government agencies collaboration creates the necessary environment to renovation.
Measuring	Annual update of carbon emissions baseline
Notes	Energy saving is provided from 6035 buildings in the region is 292.094 (MWh). They are all expected to be insulated until 2020. When they are all renewed 55% of energy saving is. It is equal to close 68350 tonnes of CO ₂ e.

Project Name	Bahriye Üçok - Green Kindergarden Project
Project Coordinator	Plan and Project Department & Construction Department
Municipality Department (Director) :	<p>Green nursery project is targeted to applications for platinum LEED certification.</p> <p>Teaching and learning in healthy, eco-friendly hands-on training, to the use of gray water and rainwater, natural ventilation and so on. with an emphasis on issues such as feasibility studies start of the project was completed, the project has been prepared with the principles of passive design.</p>
Project Description	<ul style="list-style-type: none"> • Increasing the attention towards green buildings. • Healthy Learning Spaces • Teaching Healthy Spaces • Saving Money • Practical Training • Nature-Friendly
Project Benefits	<i>Carbon Emission Reduction Target: 105 tonnes CO₂</i>
Funding	Sponsors & Volunteers
Notes	<p>The total construction area is 1107 m², basement and ground floors of the building of the kindergarden;</p> <ul style="list-style-type: none"> • Ground Floor; welcome, waiting for the administrative staff areas, service areas, 5 classrooms for different age groups and the common play area • In the basement, dining room and kitchen, the technical departments, service areas, a sleeping room, business class and science in every class.

9.5. Awareness- Oriented Projects

Project Name	Let's See Your Bike!
Project Description	<p>This project will promote the use of bicycles and drivers will be steered to healthy and clean public transport. Citizens will leave their vehicles in the parking areas located on the main roads where rental stations will be created and by using alternative routes, with their rental bikes, they will be able to reach metro-metrobus-train stations and ports in the district.</p> <p>On a pilot implementation; 8 bicycle parking lots, 2 stations and 10 bikes are planned and the using rules of bicycles and the routes will be given in the web site. The energy of the project will be taken from renewable energy. (solar panels)</p>
Project Benefits	<i>Carbon Emission Reduction Target: 1440 tonnes CO₂</i>
Funding	Project Cost: 34.800 €

Project Name	Ecological Park
Project Description	<p>Ecological Park is a recreational area where climate change and energy efficiency studies of the municipality are shared with the public. In order to increase awareness about climate change and its effects, the themes related to these topics will be developed inside the park.</p> <p>Water efficiency, energy efficiency and sustainable transport for the (bike training area) portable visuals and activities will take place in the park. Also, the park will be designed to use as an exhibition area for the ecological projects.</p>
Project Benefits	<i>Carbon Emission Reduction Target: 100 tonnes CO₂ (estimated)</i>
Project Cost	80.000 €
Funding Resources	Municipality Budget, international funds, credits
Roadmap to reach the target	In order to constitute an ecological park, a suitable area will be determined by the municipality. By contracting with the institutions and organizations working on energy and water efficiency, and also sustainable transport issues, the best methods will be determined with a consensus.
Measuring	Annual update of carbon emissions baseline

Project Name	“Step by Step” Energy Efficiency
Project Description	Step by step, is a energy efficiency awareness project for students in primary and secondary schools. Technical information about energy efficiency and climate change will also be adapted to the levels of the students. Thus, awareness will be transferred from students to their families.
Project Benefits	Financial Savings: 6.100 € (annually) <i>Carbon Emission Reduction Target: 45.3 tonnes CO₂</i>
Funding	Project Cost : ~ 20.000 €
Funding Resources	Municipality Budget, funds
Roadmap to reach the target	Training sets will be supported by Audio-visual materials (posters, brochures, etc.). Students are given a participation certificate, monitoring will be done to reach the targeted amount of audience.
Measuring	Annual update of carbon emissions baseline

Project Name	Awareness Raising& Training
Project Description	<p>Launch an overall awareness campaign covering all aspects of carbon reduction. Plan to carry out awareness campaigns at regular intervals to increase effectiveness.</p> <p>This will include:</p> <ul style="list-style-type: none"> • Establishing a network of environmental entities • Establishing an environmental training package for staff • Incorporating environmental competencies into all new job descriptions; • Raising awareness of teleconferencing facilities and discouraging unnecessary travel; • Raising awareness and encouraging staff to recycle batteries using containers provided; • Increasing awareness on Regulations such as “ Building Energy Control” • Publishing quarterly energy consumption figures and carbon emissions on Municipality web page.
Project Benefits	<p>Financial Savings: 130.000 €</p> <p><i>Carbon Emission Reduction Target: 745 tonnes CO₂</i></p>
Funding	<p>Project Cost : ~ 40.000 € (Including extra staff costs)</p>
Funding Resources	Municipality Budget
Roadmap to reach the target	Availability and willingness of staff
Measuring	Annual update of carbon emissions baseline
Notes	<p>Emissions reduction calculations based on achieving a 5% municipality sourced emission reduction in building consumption (public buildings, schools, housing) as a result of the awareness campaign.</p> <p>Financial savings based on energy costs (approx 2/3 gas @ 0,085 t/kWh, 1/3electricity @0,358t/kWh)</p>

Project Name	Higher Energy Efficient Household appliances
Project Description	Altering from unefficient household appliances to efficient household appliances(refrigerators, washing machines, air conditioner, and light bulbs)in our homes.
Project Benefits	<i>Electricity Reduction Target:19.293,78 MWh</i> <i>Carbon Emission Reduction Target: 11.904 tonnes CO₂</i> <i>1,2% reduction from CO₂e</i>
Funding Resources	All parties (government, citizens etc.) are involved to the process.
Roadmap to reach the target	Today's household appliances consume 20% less energy than old models of household appliances. Citizens are going to buy new energy efficient household appliance when we take into account expensiveness of electricity consumption in Türkiye
Measuring	Annual update of carbon emissions baseline of electricity consumption in residents

Project	CO ₂ Reduction (tonnes)	Project Cost (€)
Lighting Oriented Projects		
Efficient Lighting Project for Recreation Areas	213,2	103.500
Electrical Vehicle Consept Projects		
Electrical Car Charging Stations	44	12.000
Transformation of municipality's Service Vehicles to Electrical Vehicles	1670	160.000
Collection of Waste with Hybrid Vehicles	271,3	95.000
Renewable Energy Projects		
Kadıköy Youth and Sports Center Solar Panel Application	54,4	127.000
Kalamış Atatürk Park Solar Panel Application	3,5	12.000
Zübeyde Hanım –Wedding Hall Solar Panel Application	54,4	134.000
Renewable Energy for Building	426,48	16 million
Buildings Oriented Projects		
Existing Building Reconstruction	128.000	85 million
Buildings Insulation	68350	40 million
Bahriye Üçok - Green Kindergarden Project	105	
Awareness Oriented Projects		
Let's See Your Bike!	1440	34.800
Ecological Park	100	80.000
“Step by Step” Energy Efficiency	45.3	20.000
Awareness Raising& Training	745	40.000
Higher Energy Efficient Household Appliances	11.904	
TOTAL	213.426,6	141.818.300 €

According to the calculations, in 2010 the overall carbon dioxide emission of the district including municipality buildings and parks, municipality vehicle fleet, residential buildings, territory buildings, street lighting, public transportation, personel and commercial transportation is 2.535.448 tonnes of CO₂e. Kadıköy Municipality is responsible for 1.004.000 tonnes of CO₂ e. As a municipality, until 2020, we will have a commitment of %21 decrease (213.427 tonnes CO₂ e) with 16 emission reduction projects.

Ton CO ₂ -e/per person KADIKÖY	
2010	1,91
2020	1,53

As a result, the total reduction aimed to reach until 2020 per capita is 0,38.

It corresponds to approximately 21% reduction from total CO₂ emission.

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<http://www.epa.gov/climatechange/> accessed on May 11, 2013

11. Appendixes 1

UNFCCC Sector		Scope 1 Emissions	Scope 2 Emissions	Scope 3 Emissions
Energy	Sationary Energy	Utility-delivered fuel consumption (e.g., natural gas) Decentralized fuel consumption (e.g., propane, kerosene, fuel oil, stationary diesel, biofuels, coal) Government owned utility consumed fuel for electricity / heat generation	Electricity/ heat/steam/ cooling consumption	Emissions from facilities operated by contracted businesses performing essential government services Upstream/downstream emissions (e.g., mining/transport of coal)
	Transport	Tailpipe emissions from government owned and operated vehicles	n/a	Tailpipe emissions from vehicles operated by government employees traveling to and from work Tailpipe emissions from vehicles operated by contracted businesses performing essential services Upstream/downstream emissions
	Fugitive Emissions	Fugitive emissions from energy production	n/a	Upstream/downstream emissions
Industrial Processes		Fugitive emissions from industrial processes	n/a	Upstream/downstream emissions
Agriculture		Methane emissions from government owned livestock	n/a	n/a
Land Use, Land Use Change and Forestry		Net biogenic carbon flux of government owned/operated sources	n/a	n/a
Waste		Analysis year methane emissions from government owned/operated landfill, incineration, compost and wastewater facilities	n/a	Analysis-year emissions from government waste disposed to date Embodied future emissions associated with analysis-year waste generation

12. Appendixes 2

Sustainable Energy Action Plan (SEAP) template

BASELINE EMISSION INVENTORY

1) Inventory year

2010

[Instructions](#)

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

524373

2) Emission factors

Please tick the corresponding box:

Standard emission factors in line with the IPCC principles

LCA (Life Cycle Assessment) factors

Emission reporting unit

Please tick the corresponding box:

CO2 emissions

CO2 equivalent emissions

3) Key results of the Baseline Emission Inventory

Green cells are compulsory fields

Grey fields are non editable

A. Final energy consumption

Please note that for separating decimals dot (.) is used. No thousand separators are allowed.

Category	FINAL ENERGY CONSUMPTION [MWh]															Total	
	Electricity	Heat/cold	Fossil fuels							Renewable energies							
			Natural gas	Liquid gas	Heating Oil	Diesel	Gasoline	Lignite	Coal	Other fossil fuels	Plant oil	Biofuel	Other biomass	Solar thermal	Geothermal		
BUILDINGS, EQUIPMENT/FACILITIES AND INDUSTRIES:																	
Municipal buildings, equipment/facilities	6.329,00		7.702,29														14.031,29
Tertiary (non municipal) buildings, equipment/facilities																	
Residential buildings	643.126,00		2.511.936,00														3.155.078
Municipal public lighting	879,00																879
Industries (excluding industries involved in the EU Emission trading scheme - ETS)																	
Subtotal buildings, equipments/facilities and industries	650.334,00		2.519.638,29														3169988,29
TRANSPORT:																	
Municipal fleet						23.743,70	245,00										23.989
Public transport																	
Private and commercial transport																	
Subtotal transport						23.743,70	245,00										23.989
Total	650.334,00		2.519.638,29			23.743,70	245,00		16,00								3193976,99

Municipal purchases of certified green electricity (if any) [MWh]:

CO2 emission factor for certified green electricity purchases (for LCA approach):

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

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

Locally generated heat/cold	Locally generated heat/cold [MWh]	Energy carrier input [MWh]										CO2 / CO2 eq emissions [t]	Corresponding CO2 emission factors for heat/cold production in	
		Fossil fuels					Waste	Plant oil	Other biomass	Other renewable	other			
		Natural gas	Liquid gas	Heating oil	Lignite	Coal								
Combined Heat and Power													0,00	0,00
District Heating plant(s)													0,00	0,00
Other <i>Please specify: _____</i>													0,00	0,00
Total	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	

4) Other CO2 emission inventories

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

Otherwise go to the [last part of the SEAP template ->](#) dedicated to your Sustainable Energy Action Plan

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