SUSTAINABLE ENERGY ACTION PLAN

Taraz, Jambyl Region, the Republic of Kazakhstan

INTRODUCTION

Taraz is a city and a centre of the Jambyl Province in Kazakhstan. It is located in the south of the Republic of Kazakhstan, near the border with Kyrgyzstan, on the Talas River (Taraz River). It has a population of 350,000 (statistics), which shows 9% growth since 1989 making it one of the fastest-growing cities in the country, after Astana. Taraz territory covers 110 square kilometres (length extension is 23.5 km, width extension is 12.5 km.). The distance from Taraz to Astana (the capital) is 1,255 km. Besides the regional center there are three towns of district subordination - Karatau, Zhanatas and Shu.

Altogether in Taraz there are six archeological memorials (Taraz and Tortkul sites of ancient settlement of the 1st 17th centuries, Tonkeris manor of the 6th -12th centuries), 13 historic monuments, 53 memorials of architecture and urban planning, which reflect formation periods of the planning structure and the site development of historical part of the town, and seven pieces of monumental art. The phone code is +7 7262; postal codes - 080000-080019; time zone in Taraz city is + 6 UTC.

Taraz views



It is one of the oldest cities in Kazakhstan and in Transoxania. Taraz officially celebrated its 2000th anniversary (recognised by the UNESCO) in 2001, dating from a fortress built in the area by a Xiongnu Chanyu named Zhizhi and was a site of the Battle of Zhizhi in 36 B.C. The city was first recorded under the name “Talas” in 568 A.D. by Menander the Protector, the medieval city of Talas was a large centre of trade along the Silk Road. Subsequently Talas was described by Xuanzang, who passed Talas by the river in 629 and later wrote: Travelling westward we come to the city of Daluosi. The city is 8 or 9 li in diameter, and was settled by Hu (“foreign, non-Oriental”) merchants from various nations. The products and the climate are about the same as Suyab. Talas secured a place in history by virtue of the Battle of Talas (751 A.D.), which was fought between forces of the Chinese Tang Dynasty and those of the Arab Abbasid Caliphate. The battle took place somewhere along the Talas River in the Talas valley. One of its indirect outcomes was the introduction of paper to the west, via the Arab and Chinese paper makers.

Taraz sceneries



Taraz places



Taraz attractions



HISTORY

Numerous archaeological findings and monuments in the foothills of Karatau and in Talas-Assin oasis show the antiquity of settlements in the Talas River valley, supporting the claim of Taraz to be nominated "the most ancient city in Kazakhstan". The history of the city consists of several historic periods, interrupted by destruction and depopulation. The first reference city historically linked with Taraz and the basis for the claim of 2000 year old history is the fortress of Zhizhi that briefly existed at the site of modern Taraz in the first century B.C. A city known as "Taraz" or "Talas" will be recorded in 568 A.D., and will exist until its destruction in 1209. The third historical period begins with the establishment of "Aulie-Ata" (later renamed Dzhambul and eventually Taraz again) on the same site and till present day.

PREHISTORIC TIMES

Discovery of caves and ancient campsites during the investigation of the eastern part of the Talas-Assinsky oasis in the Karatau Ranges spur has confirmed the

opinion of Bernshtam (expressed in 1903) that the Talas valley was settled before the first century B.C.: "It is doubtless that the continuation of valley's research will give main testimonies of man's stay". The remnants of material culture that were found during excavation of Taraz speak about the lifestyle in this territory to the Neolithic period.

ANTIQUITY

The discovery of ornamentation, bronze statues of kings and remnants of ceramic products in separate parts of the Talas River are the evidence of the existence of life in the Taraz region in the bronze epoch. According to archaeological excavations and available written sources, tribal unions of Saka Scythians had been formed in this territory by the 7th-8th centuries B.C.

Honshu, 70 from the first century, speaks about the fortress constructed on the Talas River by Zhizhi Chanyu, a prince of Hun (Ch. Xiongnu, Hsiung-nu, etc.). The fortress is believed to have been at the site of modern Taraz.

MEDIEVAL TARAZ

Early references

The opinion was expressed in 1903 by the authors of the book "Turkestan" that the ancient Taraz (then known as Talas) was situated under the modern Taraz. However the deficit of information, inaccuracy of descriptions and weakness of geography made it impossible to know the location until 1936. The research by Professor Wilhelm Barthold established that the location of the ancient Taraz was under the Green Bazaar. Further research and archaeological excavations, which were made by an expedition of the USSR in 1938 under the supervision of A. Bernshtam and G. Patsevich to the depth of 2-6 metres, made it possible to reconstruct the appearance and cultural and economic importance of the ancient Taraz. The latest archaeological data have considerably expanded perceptions of Taraz.

The year of Taraz's foundation is generally believed to be 568 A.D., which is the date of the first written record according to the Greek sources. At that time the Great Silk Road ran across Southern Kazakhstan. It played a major role in trade and cultural exchange between China, India, Byzantium and Persia. Taraz developed as a fortified tradecraft city on this massive transcontinental artery. Comparatively gentle climate, fertile soil and rich pastures attracted a lot of stock-breeders and farmers. In the 60s of the 6th century Taraz is included into the territory of the First Turkic Kaganate. The Sogdian merchants, who controlled the Central Asian section of the caravan route, were interested in easier access to Byzantium and initiated the first trade negotiations with the Persians and then with Byzantium. In response, Byzantium sent ambassadors to the Turkic Kaganate, and in 568 the embassy headed by Zemarchus and Maniach to the Muhan Khan arrived in Taraz at the court of Istemi Yabgu. The Persian ambassador also appeared at the court of the Turkic Kagan at the same time but Istemi Yabgu allied with Byzantium.

Unfortunately, it is not illustrated in the written sources of the time that Taraz was a big city. The Chinese pilgrim Xuanzang, who passed through Taraz in 630, came to the Ta-lo-se having traveled 8 or 9 li. (which equals 576 metres according to the Chinese measures) in this city alternately. It is known from written sources and

archaeological investigations that from the 1st B.C. to 5th A.D. Kanglu tribes lived in the Talas River valley. The similarity between the excavated materials of Taraz and Gynskiy and Usunskiy-Kanguyskiy Kurgan tribes show the introduction of Turkic language.

Mongolian features and elements appear in the settled culture of the local, mainly European, population. According to Bernshtam's statement it was a period of ethnogenesis of the modern Turkic population of Central Asia, when Taraz was joined to the Western Turk Khanate. It felt, like other cities of the region, the influence of Sogdian culture.

The data shows that Turks were the major ethnic element of the population in 4^{th}-13^{th} centuries in Taraz as in other cities of South Kazakhstan, together with Sarts, Arabs and Persians. Written sources of Paleo-Anthropological material collected from kurgans in Southern Kazakhstan show the existence of close ties between Taraz and the Kypchaks, the Quarluq population of a nearby valley. As a result of an internecine struggle among Turkish tribal leaders at the beginning of 8^{th} century, the Turkish tribe in the Ili River valley was divided into two branches: Yellow and Black. The Black (Kara) Turks owned the Taraz River valley and made Taraz their capital in the middle of 7^{th} century. In 751 in the Talas River region, upstream from the modern city of Taraz, an army comprising Tang Dinasty troops from China and Kara Turkish mercenaries fought the army of the Abbasid Caliphate. Despite winning the battle, the Caliphate forces withdrew from the region. In 766 the Kara-Turkish tribes were defeated by Quarlugs from the northwest. Later, nearly all the tribes of the former Western Turk Khanate were conquered.

The development of Taraz as a city arose as the result of the development and strengthening of political and economic ties linked to trade along the Great Silk Road. As a major halt, it flourished in a comparatively gentle climate, rich pastures and fertile soil, which attracted a lot of stockbreeders and farmers. The struggle between Persia and Byzantium for control over the route forced both sides to look for allies. Byzantium sent ambassadors to the Western Turk Khanate, and Zemarkha Kilinskiy arrived in Taraz in 568. At the same time the Persians sent their ambassador to the Turks but Istemi Khan was on the side of Byzantium.

ISLAMIC AND PERSIAN PERIOD

After the Arab conquest of Central Asia the Persians, the Persian Samanids, appeared in the Central-Eastern Asia, and in the 9^{th} century they occupied most of Central Asia. By that time Taraz, due to constant development, slowly became a rich city-state of Central Asia with a large population and vast agricultural area. In the late 9^{th} century the Samanids extended their rule into the steppes and captured Taraz (in 893), which then became one of the main cities of the Karluk kaghan. A large church was transformed into a mosque and, according to one of the sources, the "amir of Taraz" was converted to Islam. The islamisation of Central Asia was mostly due to the activity of the Samanids, and other existing religions, such as Mazdaism, Christianity, Buddhusm and Tengrism were gradually replaced in Taraz.

THE KARAKHANIDS

The Persian Samanids however were defeated by the Turkic Karakhanids who were a confederation of Karluks, Chigils, Yaghmas, and other tribes. The Karakhanids were the first Turkic group to be converted to Islam en masse, and from the 10th to 12th Taraz was ruled by the Kara-Khanid Khanate as a Muslim state. In the 10th century Taraz acquired the distinctive features of a Central Asian city. Ancient Taraz reached the climax of its development in the 11^{th}-12^{th} century under the Karakhanids. Instead of being a more or less centralised state like the Samanids, Karakhanid Central Asia was divided into many small fiefdoms or appanages. Taraz became an important centre. The political independence and autonomy of Taraz helped its development. The power over the city under one of the rulers, Tugan-Khan, was so great that he waged an independent military campaign against Samarkand and captured it for some time. Kashgar was captured and remained under the Taraz's rule for 15 months. Certainly, this political power resulted from the economic importance of the city. In the Karakhanid Era the main part of Taraz, the Shahristan and Arg, did not grow beyond their size reached in the Quarluq-Samanid Era. Arg lost its main role in the life of the city. The Shahhristan became the heart of the economic and cultural life of the city. It was there where all the military, administrative, cultural and other institutions that regulated life in the medieval feudal city-state were situated. At this time the mausoleums of Aisha-Bibi and Karakhan were built in the city and its suburbs. Taraz had an underground water supply system made of terracota pipes, as well as a sewage collection system. The Taraz Banya, which was a multiple-domed building made of fired bricks, is also of great interest. In due course the Karakhanids lost their power due to internecine wars and at the end of the 12th century the city was taken by the Kara-Khitans. In 1210 the Kara-Khitans were defeated by Khwarazmshah Mohammed.

MONGOLS

This period did not last long because in 1220 nearly all the Central Asian states and the territory of modern Kazakhstan were captured by Mongols. There were no written documents describing the growth of Taraz under Mongol rule after they razed the city to the ground. The remnants of a fire found during the excavations showed that the city had been burnt. The town was probably renamed as Yany ("New"), while mentioning this town European and Arab sources say: "the city of Yany, named Taraz before the conquest". Archaeological findings show that the once lively city lost its former significance and independence under the Mongolian yoke. The blossom of the settled life of Taraz came to an end and decline began.

Under the Chagatayids (descendants of Chagatay Khan) until 1334 coins were minted in Taraz. The princes, who, as Vasa of the 14th century states, "burnt the Golden Horde, destroyed Taraz and other cities and killed the population. They took everything they could take and burnt the rest. There was a mentioning of the city again in 1345 in the road guide book as the city was situated on the trade route from Mashara-un-nahr to Almalyk". A continuing internecine war in Central Asia did not allow active trade with distant states, and opening of a sea route from Western

Europe to India stopped the trade on the ancient Silk Road, which led to the decline of the cities situated on the route.

KAZAKHS

Lost in time, Taraz is mentioned again in 1513 with the coming of the Kazakh tribes. The once famous medieval city and a former capital was forgotten, as well as its ancient name. By the 16th century the territory of the city was absorbed into the Kazakh Khanate. The archaeological excavations show that Kazakh nomads were involved in the rebirth of Taraz with cultural links connecting the ancient medieval city with the culture of Kazakh people. The confirmation is the names of artificial channels stretched in the city. Only a small settlement was on the territory of the ancient Taraz under the Kazakh khans, the inhabitants of which were engaged in craft, agriculture and cattle breeding.. In 1723 the Talas Valley and the major part of Southern Kazakhstan was captured by Dzungars who owned it almost until 1755. At that time the Kazakh tribe community returned to its home and began reconstructing the irrigation system in the Talas Valley.

FROM AULIE-ATA TO MODERN TARAZ

The Kokand Fortress

At the beginning of the 19th century the upper part of the Talas River valley was invaded again by newcomers. This time it were the Qipchaq soldiersof the Khanate of Kokand. They built a few small fortresses mainly on the ancient ruins to guard the border and the caravan route. Due to a comparatively advantageous location of the fortress built on the ruins of the ancient Taraz, a new town began to grow quickly around it. It was first named Namangan-i Kochek (“little Namangan”), as the first settlers were from the Uzbek city of Namangan. In 1856 it was renamed Aulie-Ata in the honour of the founder of the Karakhanid dynasty. Mullahs, using the legend about the Karakhan mausoleum of the 12th century, built a new mausoleum with minarets, which had nothing in common with the old one. That new mausoleum kept the ancient name of "Aulie-Ata" ("the holy father"). The town took the same name. By that time the town had become a significant trade and craft centre. A large spring fair was held there. Agricultural and craft products were exchanged to the products of cattle breeding. Large herds of livestock bought at the fair were sent to Tashkent and Fergana through the Karrabul Pass in the Talas-Alatau. The caravan route went through the northern cities of Akmolinsk (Astana) and Petropavlovsk to Omsk.

RUSSIAN CONQUEST

In 1864 after a short siege Aulia-Ata surrendered to Russian forces led by General Mikihail Grigoryevich Chernyaev. Soon a line of Russian fortifications went across the steppe and connected with the Syr-Darya line through Chimkent. A whole part of this land became part of the Russian state. A new Russian quarter was added to the old Aulie-Ata. Its streets were lined with pyramidal poplars and new brick houses were built. By that time the city was inhabited with 2,000-3,000 families and had houses shops, mansions and small adobe houses for the poor. At first the city was governed by a military administration and then in 1867 it became the centre of an

Uyezd, which included the territory of the modern Zhambyl Province of Kazakhstan and the Talas Province of Kyrgyzstan. The city continued to play a significant role in livestock trade and cattle breeding. A few small industrial enterprises appeared there, including wine-making ones. In 1876 the first European type school was opened by a Russian priest. At that time the city had 11,700 inhabitants - besides Russians and Ukrainians there were a lot of Sarts; Kazakhs were nearly absent as they led a nomadic way of life. A full description of the city at the beginning of the 20th century is given in Russian. It is mentioned that Aulie-Ata had a large market and some transport offices. The population consisted of Russians, Kazakhs and Sarts.

The ethnic structure of the city according to the 1897 census was as follows:

Total - 11,722

-Sarts (Tajik and Uzbek settlers from the Zarafshan oasis) - 8,846 (75.46%)

-Russians - 1,366 (11.65%)

-Kyrgyz and Kazakhs (Kaysak / Kara Kyrgyz) – 589 (5.02%)

-Tajiks (Persian speaking merchants from the Fergana oases) 400 (3.41%)

There were 3 churches, 2 mosques, a post and telegraph office, a local city school, a hospital, a military hospital, factories and plants, 1791 houses, 1905 inhabitants. The organisation of social services was at a low level, housed were mainly built of adobe.

During the first two decades after the Russian revolution and the Civil War, Aulie-Ata remained a small town. It was renamed Mirzoyan (Russian: «Мирзоян») in 1936 after Levon Mirzoyan, an ethnic Armenian head of the communists of Kazakhstan. In 1938, when Mirzoyan lost power, the city was renamed Dzhambul (Russian: «Джамбул», Kazakh: «Жамбыл») after Zhambyl Zhabayev, a Kazakh akyn (a folk singer). Starting in the 1930s, Dzhambul, along with other regions of Kazakhstan, became the place of residence for large numbers of deported peoples. Millions of the Volga Germans, Chechens, Ukrainians, Koreans and other ethnic minorities, along with other marginalised elements (former kulaks, members of the aristocracy, families of convicted “enemies of the people”, etc.) were forced to move to Kazakhstan, many of them settled in Dzhambul. Some of them were evacuated to Kazakhstan and to Dzhambul during World War II from the regions that were, or were feared to come, under German occupation. The city’s population continued to grow throughout the 1960s and 1970s despite the end of exiles, due to an industrial push the city received at the time. Consequently, Dzhambul had a highly diverse population composed of several ethnic groups, the largest being the Russians followed by the Kazakhs. Fast-paced industrialisation brought many advantages of modern urban life to the city that were previously mostly unknown, such as typical Soviet apartment blocks and condo-style houses, now all supplied with electricity and water; roads and public transport; several higher education institutions; large public parks, shops, etc. Although chemical and construction industries made up the core of the city’s economy, Dzhambul continued to function as an unofficial trade post with its proximity to the other Central Asian Republics and a relatively mobile population. The city was famous in the area for its large bazaars with farmers selling agricultural products from all the region.

KAZAKHSTAN INDEPENDENCE TIME

Dzhambul, along with most of Kazakhstan, suffered a severe economic crisis in the early 1990s after the collapse of the Soviet Union, with many industries coming to an almost complete halt. The demography of the city also changed drastically. The city lost a significant part of its population with the exodus of various nationalities that once made up its diversity, in particular, the Volga Germans and the Jews, as well as many Russians and Ukrainians. The trend was partially off-set by the migration of Kazakhs from rural areas to cities. The name of the city was changed to its Kazakh spelling of Jambyl in early 1992, and to Taraz in 1997. The city's economy experienced a partial revival in the early 2000s. The city has established a sister city relations with Fresno, California, US according to Sister Cities International. In 2001 Taraz also established a sister city relations with Muncie, Indiana, facilitated by Interlink Resources, Inc. (www.interlinkresources.org).

CLIMATE

The climate of Taraz is continental with mean January temperature of -5 °C, and mean July temperature of 26.5 °C.

Climate data for Taraz

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Average high °C (°F)	0 (32)	2 (36)	11 (52)	20 (68)	28 (82)	32 (90)	35 (95)	32 (90)	27 (81)	19 (66)	9 (48)	1 (34)	18.0 (64.4)
Average low °C (°F)	−10 (14)	−7 (19)	−1 (30)	6 (43)	11 (52)	16 (61)	18 (64)	16 (61)	10 (50)	2 (36)	−4 (25)	−8 (18)	4 (39.3)
Precipitation mm (inches)	25 (0.98)	27 (1.06)	30 (1.18)	35 (1.38)	25 (0.98)	10 (0.39)	5 (0.2)	5 (0.2)	5 (0.2)	15 (0.59)	25 (0.98)	35 (1.38)	242 (9.53)

Source: Svali.ru

ENERGY SYSTEM OF TARAZ

Enterprises producing electricity and heating energy in Zhambyl region include the following subjects:

1) ***Electricity generation:*** electricity production in region based on traditional and renewable sources. All produced electricity have to be sold to JSC "Kazakhstan Electricity Grid Operating Company " (KEGOC) - System Operator of the Unified Power System of the Republic of Kazakhstan according to advance request for each producer. Main electricity energy producer in region is Zhambylskaya GRES (power plant) with capacity 1200-1300 MWh/y. Production limits stated in advance also by KEGOC. Also in parallel Zhambylskaya GRES is producing the heat energy covering 2% of the region consumption.

-Also in region operate 6 renewable energy plants: one solar, three hydroelectric power plants (HPP) and two wind power plants (WPP) – totally they produce 19 MWh/y of electricity, which have to be sold also to KEGOC and transmitted to centralized national network. 6 more RES projects in region will be realized soon.

2) ***Electricity distribution:*** LLP "Zhambyl electrical networks" (ZES) is distributing and transmitting electricity over their networks to consumers, received from KEGOC unified national power grid according to national distribution in country.

ZES network:
Substations 110-35 kW – 13;
Distribution substations – 17;
Transforming substations – 835;
Overhead lines 6-10 kV – 302 km;
Cable lines 6-10 kV – 406 km;
Overhead lines 0.4 kV – 365 km;
Cable lines 0.4 kV – 305 km;
Outdoor lighting grids – 477 km;

3) ***Heat generation and distribution:*** 4 heat generated plants are operating in Zhambyl region

- Production capacity of JSC "Taraz Energy Center" (CHP-4) is 600GKal. CHP-4 producing 80% of heat energy consumption in region. Also CHP-4 in parallel generates 70-80MWh/y of electricity and sells it to nearby industrial plants;
- GKP "Zhambyl Zhylu" heat production covers 10-12% of consumption;
- GKP "Temirzhol Zhylu" heat production covers 5-7% of consumption;
- LLP "Sofia" - provides 2-3% of heat consumption.




GENERAL DESCRIPTION OF ENERGY SECTOR IN KAZAKHSTAN

Today energy is the most important driver of the global economic progress and its state directly determines the well-being of billions of people on the planet.

Kazakhstan owns large reserves of energy resources (oil, gas, coal, uranium) and is an energy power.

Kazakhstan ranks 58th among 129 world countries in the Energy Sustainability Index. According to the press service of the Ministry of Industry and New Technologies of the Republic of Kazakhstan, these are the data from the World Energy Council report.

The Index of the World Energy Council is based on the comparative analysis of the energy situation in a country on the basis of three parameters: energy security, accessibility and affordability of electricity for the population and environmental sustainability of the energy industry. In accordance with success on each of the dimensions, countries are ranked from A to D. The total rating of Kazakhstan is ABD.

The rating of our country has grown and significant success was achieved by Kazakhstan in the area of energy security. The indicators of the energy security of the country have grown due to reduction of accidents and losses, and better compliance of different electricity indicators with the standard values. For the first time our country has become one of the top ten countries and ranks 6th among the 129 countries of the world. We are ahead of Great Britain (11th), the US (12th), China (18th), Switzerland (19th), Spain (22nd), Sweden (24th), Germany (31st), the United Arab Emirates (49th), Georgia (106th).

Stable indicators of the accessibility and affordability of electricity for the population must also be noted. At present Kasakhstan firmly ranks 35th among the 129 world countries on this parameter, far ahead of the United Arab Emirates (37th), Hungary (42nd), Mexico (47th), Russia (61st), Latvia (72nd), Ukraine (73rd), Bulgaria (77th), Turkey (82nd), China (101st).

Besides, the creators of the international rating note significant increase in the environmental sustainability of the energy sector of Kazakhstan, due to the social responsibility to preserve the resources and reduce the amount of produced waste. The use of new technologies and other measures aimed at minimal harmful environmental impact has moved the country three lines upwards in the world rating. Kazakhstan ranks 116th on the environmental sustainability parameter, ahead of such countries as Kuwait (122nd), China (126th), etc.

In his annual address to the people of Kazakhstan the President of Kazakhstan pointed at the necessity of rapid infrastructural support of the main economic sectors, including electricity development measures:“On my decree, the Government has developed a National Programme of Forced Industrial and Innovative Development and a detailed Industrialisation Map of the country”, which includes first of all energy efficiency, energy saving, RES development, CO2 emissions decreased actions and projects.

Currently, a clear division of most of the countries into three groups has formed, based on the per capita GDP and the energy availability (Table 1).

Aggregate demographic, macroeconomic end energy parameters of groups of states

Group of states	Number of states	Population	Share of total GDP in	Share of electricity consumpt	Range of per capita GDP	Range of per capita electricity

			GWP	ion from the world consumption	thousand USD according to PPP	consumption (kWh per year)
Group I	49	18,9	57,27	59,56	15-120	3000-13000
Group II	42	32,9	27,88	31,29	8-15	1000-8000
Group III	88	48,92	14,85	9,15	0,5-8	100-1000

Kazakhstan, with its per capita GDP of 12 thousand USD according to the PPP and per capita electricity consumption of 5,300 kWh per year, is in the middle of Group II on the electricity consumption and one of the leaders in the Group on the per capita GDP.

At that, Kazakhstan with its 0.24% of the Earth population exports about 1.4% of the world energy consumption and used to be a net exporter of electricity until 2010. This shows, on the one hand, the significance of Kazakhstan in the world energy sector and, on the other hand, strong dependence of economy on oil exports.

In order to have a better understanding of Kazakhstan's significance, it must be noted that the oil exports from the country satisfy the average world consumption of oil by 94 million people.

Due to the existing strong dependence of world economy on the carbon-based energy resources, it is necessary to observe the strategic conditions of developing the activity of carbon-containing energy sources donor states.

1. In the mid term, at least minimal parity between the exploration and the production of carbon-containing energy sources must be established;
2. In the long term – the role of the energy guarantors must be secured.

As practice shows, non-observation of these conditions in the unstable world can and will provoke new crises, the depth and the implications of which can significantly surpass those we are witnessing at present.

The access to energy is more and more often considered an important catalyst to a broader social and economic development, including education, healthcare, sustainable development of agriculture and job creation. Energy for production purposes is of special importance for launching local innovative businesses and creating a more dynamic economy for communities and countries with simultaneous provision of social benefits.

The increased energy efficiency will raise the global productivity of the resources, create new economic growth with new local jobs and improve the quality of life of all the citizens.

Investments into the renewable energy sources create new jobs and improve the energy security of countries that do not have domestic mineral resources. Increased share of renewable energy sources can reduce greenhouse gas emissions and local pollution, isolate countries from fuel price fluctuations and improve the balance of payments. The renewable energy sources are also becoming more and more economically competitive. Hydrothermal, geothermal and bio-energy have already been competitive for a long time in the areas with good resources, and wind and solar energy are also economically attractive in many places.

Currently Kazakhstan ranks the first in the world on the specific greenhouse gas emissions indicator per GDP unit (3.38 kg per dollar).The country is planning to reduce the greenhouse gas emissions into the atmosphere by 15% by 2020. At the same time, the current volume of the renewable energy sources production in Kazakhstan is 0.5%, while all the RES potential is almost 1 trillion kWh. In 2020 the capacities of the renewable and alternative energy sources in Kazakhstan will be at least 1040 MW. According to the plan, the RES electricity generation will reach 1% of the total consumption in 2014 and 3% in 2020.

RENEWABLE ENERGY SOURCES IN KAZAKHSTAN

Kazakhstan is one of the key elements of the global energy security. Kazakhstan's national leader, President Nursultan Nazarbayev, has addressed the nation with an annual speech saying that as early as by 2050 the share of renewable energy in Kazakhstan's energy mix should amount to more than 50%. 'It is clear that the era of carbon economy is drawing nigh its end. A new age is coming when the human activities will be based not on oil and gas but on renewable energy,' President Nazarbayev said.

Over the recent years Kazakhstan has emphasized renewable energy as one of dimensions to the energy development. It is testified by greater attention to the implementation of renewable energy on the part of the government and businesses. Yet, in order to create a solid renewable energy industry in Kazakhstan, large-scale financial and technological investments are required involving the government. If no such investment is to come, renewable energy cannot develop.

As a matter of fact, the key factor behind the development of renewable energy in Kazakhstan, just as elsewhere in the world, is the need to decrease the negative effect of energy production on the environment.

There are grounds for optimism as over the recent years Kazakhstan has adopted a legal framework and a number of industry-specific programmed aimed at facilitating renewable energy development.

Presently, we are witnessing greater interest in renewable energy projects in Kazakhstan on the part of investors, including from abroad, mainly from China and Germany thanks to the adoption of key elements of Kazakhstan's legal framework.

Kazakhstan is the first Central Asian country to have elaborated a strategy to transition towards a low-carbon economy, which also takes heed of renewable energy.

Kazakhstan's experience in drawing up the only wind atlas in the post-Soviet space is the reason why potential investors take a great interest in this country. The wind atlas is one of the major outcomes of a large-scale joint wind energy project between the Government of Kazakhstan and the UNDP. However, the overall number of renewable energy projects in Kazakhstan is as of yet small. The principal driving force behind cooperation in renewable energy at the international level is still certain businessmen from Kazakhstan, Russia, China, Ukraine, the US, Germany etc. They are working on their own promoting new ideas and projects in different sectors related to renewable energy development, be that the production or supplies of equipment, consulting services, design engineering or scientific research.

Over the recent years Kazakhstan has held a great number of large-scale events, which allowed our country to gain weight at the international level. Among the most important of these events and activities are the OSCE summit, the OIC presidency, summits of world and traditional religions leaders, the Astana Economic Forum which is becoming more famous and gaining greater recognition each year, and the 2011 Asian Winter Games. Yet, one of the central events of the year 2012 is Kazakhstan's major international achievement, the right to hold the Expo 2017 International Exposition.

At Kazakhstan's proposal, Expo 2017 will focus on the theme 'Future Energy', namely sustainable energy consumption, which is one of the most important and urgent issues of today the international community is concerned with. Presently, all nations have set the objective of achieving sustainable development, i.e. a healthy balance between development and protecting the environment.

Astana will become a platform for demonstrating the world's best innovations and trends in this field. It will gather the luminaries of world science and bring together most prominent businessmen. As Kazakhstan aspires to become an innovative state, the exposition can give a strong impetus to diversifying our economy, modernizing our production capacities and scientific equipment and bringing investment to our country.

Expo 2017 is going to open up new horizons for the development of Kazakhstan's economy in the fields of renewable energy and cutting-edge technologies.

COVENANT OF MAYORS EAST (COMO-East)

November 23, 2012 – Kazakhstan has held the first presentation of the European Commission Initiative entitled the Covenant of Mayors Going East.

This initiative seeks to resolve a pending environmental issue which is of concern not just to the Western world, but to a greater number of municipal authorities in the European Neighbourhood countries. The initiative presupposes the need to facilitate the engagement of cities from Central Asia and the Eastern Partnership in achieving sustainable development and creating a sustainable energy system.

The COMO-East is closely related to such priorities as energy efficiency in Kazakhstan; moreover, it is in line with Kazakhstan's national priorities (See the Law on Energy Conservation and Greater Energy Efficiency and Kazakhstan's Comprehensive Plan on Greater Energy Efficiency for 2012-2015).

The Covenant of Mayors is the EU flagship initiative bringing together municipal, regional and national authorities to implement voluntary obligations to decrease CO2 emissions by no less than 20% by 2020 through greater energy efficiency and the use of renewable energy.

Since the Covenant of Mayors was adopted in 2008 it has become the leading initiative to support and encourage municipal authorities in developing and implementing sustainable energy programmes. In this way the Covenant of Mayors contributes to developing an environmentally friendly economy and improving the quality of life in town. It is achieved through better access to energy, new jobs, greater economic and social welfare and finding solutions to the issues related to the climate change. The COMO-East Offices in Lviv (Ukraine) and Tbilisi (Georgia) that have recently been established provide administrative, technical and information support to Armenia, Azerbaijan, Belarus, Georgia, Kazakhstan, Kyrgyzstan, Moldova, Tajikistan, Turkmenistan, Ukraine and Uzbekistan.

There are six cities in Kazakhstan that have signed the Covenant of Mayors East. These are Aksu, Astana, Lisakovsk, Petropavl, Satbayev, and Taraz. The COMO-East not only shares the rich experience from all across the world and from the EU in energy efficiency and cutting emissions, but it also allows new independent states to gain access to cutting-edge energy-efficient technologies and best practices. Hence, an opportunity arises to get additional investment to implement these technologies and practices with due regard for national priorities and distinct features of each country.

Since the beginning of 2012 in Taraz had been started the implementation of DACO project. DACO is supported by the following partners: Province of Chieti (Italy), the Energy Agency ALESA (Italy), Energy Charter Secretariat and 4 cities recipient. Sumgait (Azerbaijan), Novogrudok (Belarus), g.Somoniyon (Tajikistan) and Taraz (Kazakhstan).

8 October 2013 during the VIII Eurasian Forum Kazenergy in Astana the Akim of Taraz city participated in the round table "Energy Efficient Cities", in which an official ceremony held accession Taraz initiative Covenant of Mayors.

In the city of Taraz, Zhambyl Region, according to the government policy permanently is being implemented the following measures to reduce the CO2 emission and increase energy efficiency:

- Approval of Comprehensive energy saving and energy efficiency plan for 2013-2015 for Zhambyl region as a part of such Plan for entire Republic of Kazakhstan;
- Installation of Automated system of electricity control and record, this system ensures in the apartment houses from 30-40% to 7-8%, and in individual hoses from 35-45% to 15% the reduction of energy losses;
- Production (LLP “Energy Taraz”) and utilization of energy-saving LED lamps to ensure the electric energy saving by 55-60%;
- Renovation of municipal buildings by carrying out a thermo-modernization of doors and windows in the buildings;
- Modernization of apartment houses residential buildings by carrying out a thermo-modernization of doors and windows as well as overhaul of roofs, basement allocation of engineer communications;
- Awareness-raising of population of the private sector on energy efficiency, use of energy-saving lamps, transition from solid fuel to gas heating;

- Landscaping of parks, streets, yards and other public places in the city;
- Timely cleaning and removal of SDW from garbage sites;
- Modernization of outdoor lightning networks to use LED lamps with lower power in order to ensure energy saving;
- 33 units of public transportation vehicles are being in modernization process to use the natural gas as a fuel.

METHODOLOGY AND SOFTWARE FOR BEI DEVELOPMENT

METHODOLOGY

By joining the Covenant of Mayors, in order to reduce CO_2 emissions the Municipality commits itself to write and to put into effect its own Sustainable Energy Action Plan. In particular, according to the indications of the European Commission, the general objective of the Plan is:

"The SEAP must contain a clear reference to the signatory's own core commitment for a reduction of CO_2 emissions by 2020. This commitment needs to be at least 20% and based on reference levels, which are defined on the basis of a Baseline Emission Inventory.
Eastern signatories will have three options to set their emissions reduction objective:

As an absolute reduction;
As a per capita reduction;
On the basis of a Business as Usual (BAU) scenario, i.e. as an absolute reduction compared to forecast CO_2 emissions in 2020."

To this purpose the Baseline Emission Inventory developed by the Municipality must have the following general characteristics:

- "*The BEI has to be relevant to the local situation, i.e. based on energy consumption/production data, mobility data etc. Estimates based on national/regional averages would not be appropriate in most cases, as they are unlikely to be representative of the specific territorial circumstances and will not represent a relevant starting point for measuring the efforts made by the local authority to reach its CO_2 targets.*
- *The methodology and data sources should be consistent throughout the years, i.e. the same methodology used to prepare the BEI should be adopted to elaborate the subsequent inventories.*
- *The BEI must cover at least the sectors in which the local authority intends to take action to meet the emission reduction target, i.e. all sectors that represent significant CO_2 emission sources.*
- *The BEI should be accurate, or at least represent a reasonable vision of the reality.*
- *The data collection process, the data sources and the methodology for calculating the BEI should be well documented (if not in the SEAP then at least in the local authority's records).*
- *In the case of Eastern Partnership and Central Asian signatories it is highly recommended to include the monitoring of energy expenditure both in the BEI and in the subsequent inventories."*

Therefore, according to the European Commission's instructions, the CO_2 emission inventories must include at least 3 of the following sectors:

Municipal Buildings, Equipment/Facilities;
Tertiary Buildings, Equipment/Facilities;
Residential Buildings;
Local Transport.

Which normally are the ones with higher impact over the whole municipal production.
The minimum criteria currently applied for SEAP acceptation is that at least are foreseen actions for the municipal sectors and one of the other key sectors.

Nevertheless, the recommendation is to include all the sectors mentioned above and as many as possible of other relevant sectors of activity.

At a municipal level, the lack of detailed data do not allow to evaluate directly the above mentioned emissions, therefore different evaluation procedures will be defined in the following pages.
This BEI has been written for the Municipality of Taraz in the reference year 2012; for this reason total electric energy and thermal consumptions in every sector must always be referred at this year.
Conversion factors used to evaluate CO_2 emissions are the ones recommended by the European Commission (tables 1, 2 and 3). To draw up this document have been used standard factors.

TYPE	STANDARD EMISSION FACTOR [t CO_2/MWh]	LCA EMISSION FACTOR [t CO_2-eq/MWh]
Motor Gasoline	0.249	0.299
Gas oil, diesel	0.267	0.305
Residual Fuel Oil	0.279	0.310
Anthracite	0.354	0.393
Other Bituminous Coal	0.341	0.380
Sub-Bituminous Coal	0.346	0.385
Lignite	0.364	0.375
Natural Gas	0.202	0.237
Municipal Wastes (non-biomass fraction)	0.330	0.330
Wood (a)	0 – 0.403	0.002 (b) – 0.405
Plant oil	0 (c)	0.182 (d)
Biodiesel	0 (c)	0.156 (e)
Bioethanol	0 (c)	0.206 (f)
Solar thermal	0	- (g)
Geothermal	0	- (g)

TABLE 1. Example of Standard CO2 emission factors and CO"-eq LCA emission factors for most common fuel types

(a) *Lower value if wood is harvested in a sustainable manner, higher if harvesting is unsustainable.*

(b) *The figure reflects the production and local/regional transport of wood, representative for Germany, assuming: spruce log with bark; reforested managed forest; production mix entry to saw mill, at plant; and 44 % water content. The local authority using this emission factor is recommended to check that it is representative for the local circumstances and to develop an own emission factor if the circumstances are different.*

(c) *Zero if the biofuels meet sustainability criteria; fossil fuel emission factors to be used if biofuels are unsustainable.*

(d) *Conservative figure regarding pure plant oil from palm oil. Note that this figure represents the worst ethanol plant oil pathway and does not necessarily represent a typical pathway. This figure does not include the impacts of direct and indirect land use change. Had these been considered, the default value could be as high as 9 t CO_2-eq/MWh, in the case of conversion of forest land in the tropics.*

(e) *Conservative figure regarding biodiesel from palm oil. Note that this figure represents the worst biodiesel pathway and does not necessarily represent a typical pathway. This figure does not include the impacts of direct and indirect land use change. Had these been considered, the default value could be as high as 9 t CO_2-eq/MWh, in the case of conversion of forest land in the tropics.*

(f) *Conservative figure regarding ethanol from wheat. Note that this figure represents the worst ethanol pathway and does not necessarily represent a typical pathway. This figure does not include the impacts of direct and indirect land use change. Had these been considered, the default value could be as high as 9 t CO_2-eq/MWh, in the case of conversion of forest land in the tropics.*

(g) *Data not available, but emissions are assumed to be low (however the emissions from electricity consumption of heat pumps is to be estimated using the emission factors for electricity). Local authorities using these technologies are encouraged to try to obtain such data.*

FUEL	CONVERSION FACTOR (KWH/L)
Gasoline	9.2
Diesel	10.0

TABLE 2. Conversion factors for the most typical transportation

ELECTRICITY SOURCE	STANDARD EMISSION FACTOR (t CO_2/MWh_e)	LCA EMISSION FACTOR (t CO_2-eq/MWh_e)
Solar PV	0	0.020-0.050 (8)
Windpower	0	0.007 (9)
Hydropower	0	0.024

TABLE 3. Example of emission factors for local renewable electricity production

Municipal sector (building and transportation)

The energy requirement of the municipal building equipment/facilities, public lighting and car fleet, should be evaluated directly through inspections, energy bills and fuel expense records. Therefore, the CO_2 emission will be evaluated using the relations:

- Buildings (electric):
  - *Emission (t CO_2) = electricity consumption (MWh) x local emission factor for electricity (t CO_2/MWh);*
- Buildings (thermal): the following formula must be applied to any type of fuel:
  - *Emission (t CO_2) = thermal consumption (MWh) x emission factor (t CO_2/MWh);*
- Public Lighting:
  - *Emission (t CO_2) = electricity consumption (MWh) x Local emission factor for electricity (t CO_2/MWh);*
- Municipal car fleet: the following formula must be applied to any type of vehicle:
  - *Emission (t CO_2) = mileage (Km) x average consumption (l/Km) x conversion factor (kWh/l) x emission factor (t CO_2/kWh).*

Residential Buildings

Electric

Energy consumptions are usually evaluated asking data to local energy suppliers and/or agencies. Usually this study starts from the knowledge of energy consumption in a specific reference area. This value divided by the total residential building surface in the same area (available from national statistic institutes or other research centers) provides an average value of the local energy need (MWh/m^2).

The formula for the emission assessment is the following:

- *Average of electric energy consumption (MWh/m^2): Total consumption of electric energy (MWh)/ total surface of residential building (m^2);*
- *Emission (t CO_2) = Average of electric energy consumption (MWh/m^2) x surface of residential building in the municipality area (m^2) x emission factor (t CO_2/MWh).*

Thermal

Regarding thermal consumptions, buildings are divided into different typologies, according to their thermal energy performances and architectural characteristics. The information necessary to this purpose, such as the construction year, the total volume, use, number of apartments etc. are usually available in the national institutes of statistics and/or municipal, provincial or regional public offices.

The effect of the residential buildings in the municipal area is evaluated through the following scheme:

Input data:

1. Building stock differentiated per typology and construction years;
2. Climatic characteristics of the area;
3. Heating fuels.

Procedures:

1. Typical annual heating consumption per each building typology referred to the construction year;
2. Total heating consumption in the municipality area during the reference year;
3. Total heating water consumption in the municipality area during the reference year;
4. CO_2 emission assessment using emission factors.

Tertiary Building Equipment/Facilities

Electric

The tertiary sector is divided into different economical activities that can be grouped according to some basic characteristics useful for the SEAP implementation, such as:

- Commercial;
- Hotels, restaurants and bars;
- Credit and insurance agencies;

The electric energy consumption in each activity may be defined using electric energy supplier's data, while the characterization of each activity (such as the workers number) is achieved by using information from national statistic centers as well as other research centres. With such information it is possible to calculate the average energy consumption per reference value (es: worker) in each activity (kWh/reference value; ex: kWh/worker).

The energy consumption in each group will be evaluated summing up the energy consumptions of the activities inside the same group. In this way we have:

- *Electric energy consumption for the reference value (MWh) = (Electric energy consumption at national/regional or provincial level (MWh))/(total reference value in the national/regional or provincial area);*

while the CO2 emissions at the municipal level for the tertiary sector are:

- *Emission (t CO_2) = Electric energy consumption for the reference value (MWh) x total reference value in the municipal area x emission factor (t CO_2/MWh).*

Thermal

The thermal need, whenever not available local information, can be deduced from the energy consumptions in the residential building for the most recent constructions. In this way we'll have:

- Thermal energy consumption (*MWh) = Specific thermal consumption (MWh/m^2_{anno}) * total surface (m^2)*

The CO2 emission value is given by:

- *Emission (t CO_2) = thermal energy consumption (MWh) x emission factor (t CO_2/MWh).*

Transportation (public and private)

Regarding public transportation, data are given directly by the municipal consumers as well as by the transportation agencies that serve the municipal area; for the private transportation is necessary to involve agencies and offices working in this sector.

The energy consumptions and the relative CO_2 emissions due to public and private transportations must be evaluated using the following data and procedures:

Input data:

1. Fuel sales (gasoline, diesel, LPG) on the road network;
2. Number of vehicles for typology and fuel supply;
3. Municipal road length.

Procedures:

1. Identification if the number of vehicles per fuel supply typology;
2. Evaluation of the average consumption for each vehicle typology and fuel consumption in the municipal roads (urban and extra-urban roads).
3. Emission breakdown between municipal and extra-municipal roads using traffic flow estimations and average travel distances.

Waste Management

The idea to consider waste management as part of the SEAP is assumed from the important role played by the *recycling and waste economy* in the energy conservation. The conversion factor normally used for general waste to landfill (with energy recovery and taking into account the effect of CO_2 capture in landfills) is about 32 kg of CO2eq./ton of urban waste.

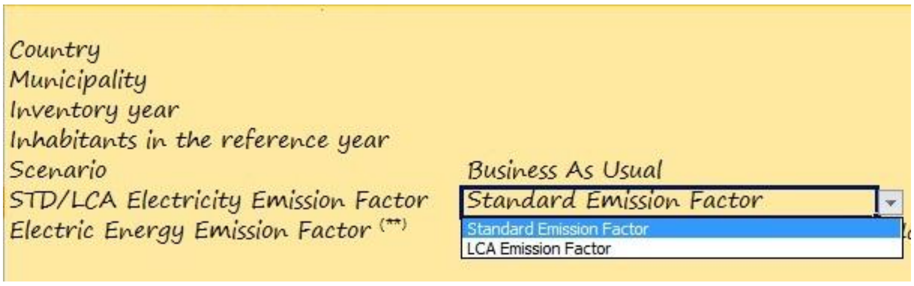
Sectors Identification

Based on the above explained methodology and on the characteristics of the municipality's territory, are following listed an example of the sectors on which develop the baseline emission inventory in the reference year. On these sectors will be developed the action plan through which reduce CO_2 emissions:

SECTORS	FIELDS OF ACTION
BUILDINGS AND EQUIPMENT/FACILITIES	1. Municipality Building Equipment/Facilities 2. Tertiary Building Equipment/Facilities 3. Residential Buildings 4. Municipal Public Lighting
TRASPORTATIONS	1. Municipal Fleet 2. Public Transportation 3. Private and commercial transportation
OTHER	1. Waste Management 2. Industries

SOFTWARE

Software to develop BEIs has been produced using the knowledge of the Province of Chieti (Italy) and ALESA Srl and the official guidelines of the Covenant of Mayors.
On the first introductory sheet it is possible to specify the following data:



In particular it is possible to define the scenario (BAU, absolute and per capita reduction) and the emission factor (LCA or standard emission factor) allowing in this way the software to set automatically all suitable conversion factors among a wide set of fuels.
Using colored tables it is easier to understand the elaboration process of the software. More in depth yellow boxes represent the necessary data to elaborate the BEI, white boxes for optional data (otherwise evaluated by the software) and green boxes for output data.
The software allows the user to mind only about data collection according to the format required in the different tables, decreasing the possibility of human errors during to the elaboration process.

BUILDINGS AND EQUIPMENT/FACILITIES

1. <u>MUNICIPALITY BUILDING EQUIPMENT/FACILITIES</u>

It is necessary to identify buildings directly managed by the Municipality and to report their consumptions in the following table:

Identification	Dimensional Data	FUEL		Energy Consumptions		Certified green electricity purchases		Heat / cold thermal energy purchases		CO_{2-eq} Emission (ton/yr)		CO_{2-eq} Total Emission (ton/yr)
	Net Volume (m^3)	Consumptions* (m3; litre; kg; kWh)	TYPE	Electric Energy (MWh/yr)	Fuels (MWh/yr)	% of electric energy consumptions	Emission factors (t/MWh) (only for LCA approach)	Heat / cold Energy (MWh/yr)	Emission factors (t/MWh)			
			-	**0,00**	**0,00**			**0,00**		**Electric** **Fuel** **Heat/cold**	**0,00** **0,00** **0,00**	**0,00**
			-		0,00				0,00	Electric Fuel Heat/cold	0,00 0,00 0,00	0,00
			-		0,00				0,00	Electric Fuel Heat/cold	0,00 0,00 0,00	0,00
			-		0,00				0,00	Electric Fuel Heat/cold	0,00 0,00 0,00	0,00

The software requires also to specify the amount of electric and/or thermal energy produced from renewable energy sources and purchased by the local authority evaluating their impact over the total CO_2 emission production.

2. <u>TERTIARY BUILDING EQUIPMENT/FACILITIES</u>

This analysis should be done for each economic activity in the municipal territory according to the procedures explained in the above methodology.

Identification	Dimensional Data	FUEL			Heat/cold thermal energy purchases		Consumptions (MWh/yr)	CO_{2-eq} Emission (ton/yr)		CO_{2-eq} Total Emission (ton/yr)
	Net Volume (m3)	Consumptions* (m3; litre; kg; kWh)	TYPE	Consumptions (MWh/yr)	Heat/cold Energy (MWh/yr)	Emission factors (T/MWh)	Electric Energy (MWh/yr)			
	0,00			**0,00**	**0,00**		**0,00**	**Electric** **Fuel** **Heat/cold**	**0,00** **0,00** **0,00**	**0,00**
		0,00 0,00 0,00	- - -	0,00 0,00 0,00		0,00		Electric Fuel Heat/cold	0,00 0,00 0,00	0,00
		0,00 0,00 0,00	- - -	0,00 0,00 0,00		0,00		Electric Fuel Heat/cold	0,00 0,00 0,00	0,00
		0,00 0,00 0,00	- - -	0,00 0,00 0,00		0,00		Electric Fuel Heat/cold	0,00 0,00 0,00	0,00

3. RESIDENTIAL BUILDINGS

Usually this is the sector with a higher impact over the total CO_2 emission production in the Municipality's territory. The software allows to choice till six different fuels for heating need; it is also possible to include the effect of district heating (or combined heat and power) energy purchases ("*Heat/cold thermal energy purchases*").

Identification	Dimensional Data	FUEL			Heat/cold thermal energy purchases		Consumptions (MWh/yr)	CO_{2-eq} Emission (ton/yr)		CO_{2-eq} Total Emission (ton/yr)
	Net Volume (m3)	Consumptions* (m3; litre; kg; kWh)	TYPE	Consumptions (MWh/yr)	Heat/cold Energy (MWh/yr)	Emission factors (T/MWh)	Electric Energy (MWh/yr)			
TOTAL	0,00			0,00	0,00		0,00	Electric Fuel Heat/cold	0,00 0,00 0,00	0,00
Residential Buildings		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. MUNICIPAL PUBLIC LIGHTING

Identification	Classification			Lighting hours* (h/yr)	Grid loss** (%)	Certified green electricity purchases		Reduction for light flux regulation*** (%)	Electric Energy Consumption [MWh/yr]	CO_{2-eq} Emission (ton/yr)
	Lamps Number	Lamp Power [Watt]	Typology			% of electric energy consumptions	Emission factors (Ton/MWh) (only for LCA approach)			
TOTAL	0		-						0,00	0,00
									0,00	0,00
									0,00	0,00
									0,00	0,00

It is possible to compare the energy consumption evaluated through the energy bills and the one estimated by the total power and the working period of the lighting system. This result gives important information about data reliability and/or about plant management.
The software includes also the power loss due to the distribution net and the possible presence of luminous flux regulators. Since it's a direct consumption of the Municipality it is also possible to specify green energy purchases.

TRANSPORTATION

1. MUNICIPAL FLEET

Identification	Mileage [km/yr]	Energy Performance* [km/l] or [km/kg] or [km/kWh]	FUEL	Energy Consumptions		CO_{2-eq} Emission		CO_{2-eq} Emission
				Electric Energy [MWh/yr]	Fuels [MWh/yr]	Electric Energy [ton/yr]	Fuels [ton/yr]	[ton/yr]
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	0,00	0,00
			-	0,00	0,00	0,00	0,00	0,00

It is better to evaluate the total energy consumption using the amount of fuels purchased in the reference year (white boxes). Whenever this information should not be available, it is necessary to use an average consumption for each vehicle and its corresponding mileage.

2. PUBLIC TRANSPORTATION

Identification	Number of vehicles	Average vehicle mileage [km/yr]	Energy Performance* [km/l] or [km/kg] or [km/kWh]	FUEL	Energy Consumptions		CO_{2-eq} Emission		CO_{2-eq} Emission
					Electric Energy [MWh/yr]	Fuels [MWh/yr]	Electric Energy [ton/yr]	Fuels [ton/yr]	[ton/yr]
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	0,00	0,00
				-	0,00	0,00	0,00	0,00	0,00

3. PRIVATE AND COMMERCIAL TRANSPORTATION

Identification	Number of vehicles	Average vehicle mileage [km/yr]	Energy Performance* [km/l] or [km/kg] or [km/kWh]	FUEL	Energy Consumptions		CO_{2-eq} Emission		CO_{2-eq} Emission
					Electric Energy [MWh/yr]	Fuels [MWh/yr]	Electric Energy [ton/yr]	Fuels [ton/yr]	[ton/yr]
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	0,00	0,00
				-	0,00	0,00	0,00	0,00	0,00

OTHER

1. WASTE MANAGEMENT

The conversion factor used for unsorted municipal waste conferred to landfill depends on waste composition; energy production and CO_2 capture effect in landfills. Whenever all necessary data should not be available, the value of 0,32 t CO_{2eq} per each tone of waste.

UNSORTED MUNICIPAL WASTE	tCO_{2-eq}

2. INDUSTRIES

Usually these data are given directly by the factories involved in the SEAP development:

Identification	Dimensional Data	FUEL			Heat/cold thermal energy purchases		Consumptions (MWh/yr)	CO_{2-eq} Emission (ton/yr)		CO_{2-eq} Total Emission (ton/yr)
	Net Volume (m3)	Consumptions* (m3; litre; kg; kWh)	TYPE	Consumptions (MWh/yr)	Heat/cold Energy (MWh/yr)	Emission factors (T/MWh)	Electric Energy (MWh/yr)			
	0,00			**0,00**	**0,00**		**0,00**	**Electric**	**0,00**	**0,00**
								Fuel	**0,00**	
								Heat/cold	**0,00**	
		0,00	-	0,00		**0,00**		Electric	0,00	0,00
		0,00	-	0,00				Fuel	0,00	
		0,00	-	0,00				Heat/cold	0,00	
		0,00	-	0,00		**0,00**		Electric	0,00	0,00
		0,00	-	0,00				Fuel	0,00	
		0,00	-	0,00				Heat/cold	0,00	

LOCAL PLANTS

Possible local plants for electric and/or thermal plants must be specified. The software uses this information to evaluate local emission factors.

Locally generated heat/cold and electricity (excluding ETS plants , and all plants/units > 20 MW)	Locally generated electricity [MWh]	Energy carrier input [Natural gas in m3, solar thermal and geothermal in kWh, other fuels in kg or litre]									
		Liquefied Petroleum Gases (LPG)	Motor Gasoline	Motor Gasoline Gas oil, diesel Residual Fuel Oil Anthracite Other Bituminous Coal Sub-Bituminous Coal Lignite Natural Gas	-	-	-	-	-	-	-
District Heating plant(s)	Heat / cold										
Other Please specify: _____											
Combined Heat and Power	Electric energy										
Other											
Total		0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00

Locally generated electricity (excluding ETS plants , and all plants/units > 20 MW)	Locally generated electricity [MWh]	Energy carrier input [MWh]										CO2 / CO2-eq emissions [t]	Corresponding CO2-emission factors for electricity production in [t/MWh]
		Liquefied Petroleum Gases (LPG)	Motor Gasoline	-	-	-	-	-	-	-	-		
Wind power												0,00	0,000
Hydroelectric power												0,00	0,000
Photovoltaic												0,00	0,000
Combined Heat and Power	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,000
Other	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,000
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	

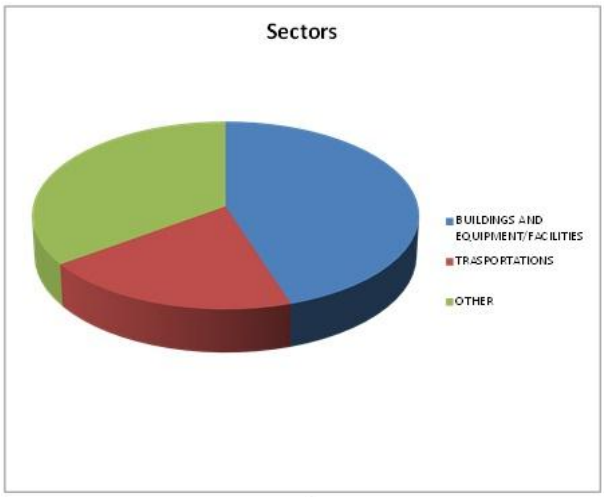
Locally generated heat/cold	Locally generated heat/cold [MWh]	Energy carrier input [MWh]										CO2 / CO2-eq emissions [t]	Corresponding CO2-emission factors for heat/cold production in [t/MWh]
		Liquefied Petroleum Gases (LPG)	Motor Gasoline	-	-	-	-	-	-	-	-		
Combined Heat and Power	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,000
District Heating plant(s)	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,000
Other Please specify: _____	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,000
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	

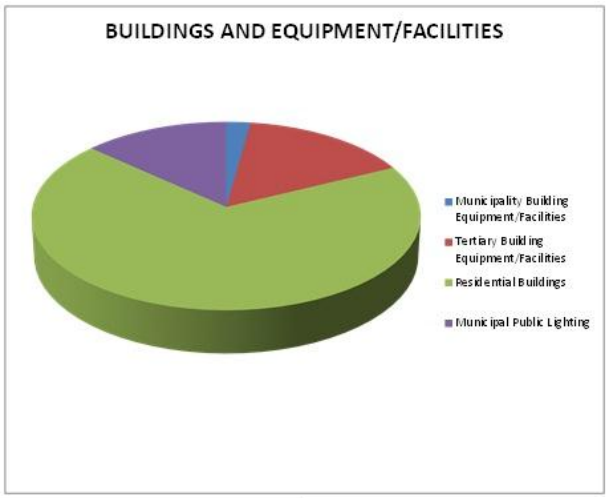
EFH=	
EFE=	

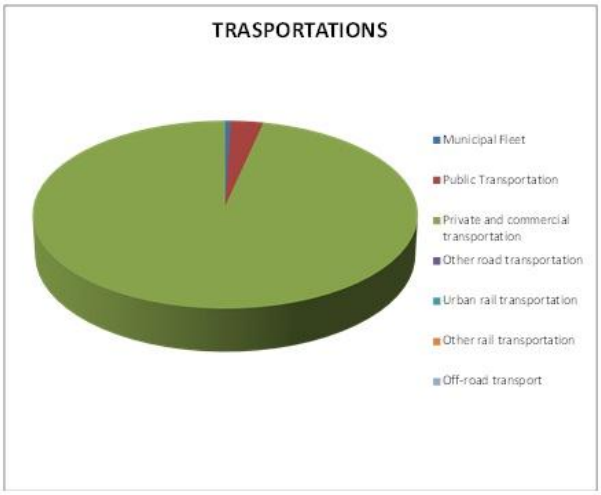
FINAL OUTPUT OF THE SOFTWARE

At this point the software is able to print a recapitulatory table and diagrams of the BEI through which have a clear vision of the baseline situation of the Municipality.

TOTAL CONSUMPTIONS					
Inventory year **xxxx**	**ENERGY FINAL ENERGY CONSUMPTIONS [MWh/yr]**			**CO2 EMISSIONS [t/yr]**	
	Electric Energy	Fossil Fuels	Heat/cold	TOTAL	%
BUILDINGS AND EQUIPMENT/FACILITIES	-	-	-	-	**0%**
Municipality Building Equipment/Facilities	-	-		-	0%
Tertiary Building Equipment/Facilities	-	-	-	-	0%
Residential Buildings	-	-	-	-	0%
Municipal Public Lighting	-			-	0%
TRASPORTATIONS	-	-	-	-	**0%**
Municipal Fleet	-	-		-	0%
Public Transportation	-	-		-	0%
Private and commercial transportation	-	-		-	0%
Other road transportation	-	-		-	0%
Urban rail transportation	-	-		-	0%
Other rail transportation	-	-		-	0%
Off-road transport	-	-		-	0%
OTHER	-	-	-	-	**0%**
Waste Management				-	0%
Industries	-	-	-	-	0%
TOTAL	-	-	-	-	***0%***


Sectors
BUILDINGS AND EQUIPMENT/FACILITIES
TRASPORTATIONS
OTHER


BUILDINGS AND EQUIPMENT/FACILITIES
Municipality Building Equipment/Facilities
Tertiary Building Equipment/Facilities
Residential Buildings
Municipal Public Lighting


TRASPORTATIONS
Municipal Fleet
Public Transportation
Private and commercial transportation
Other road transportation
Urban rail transportation
Other rail transportation
Off-road transport

BASELINE EMISSION INVENTORY

OF

TARAZ

BASELINE EMISSION INVENTORY

A Sustainable Energy Action Plan (SEAP) should be based upon credible data on energy consumption and greenhouse gas emissions within the territory under the purview of municipal authorities. Therefore, at the initial stage the baseline conditions and structures need to undergo a comprehensive assessment. The assessment starts from defining the energy consumption level of the relevant municipal facilities and services and compiling a Baseline Emission Inventory (BEI) with data on CO2 emissions related to energy consumption in the baseline year.

A BEI and subsequent inventory of CO2 emissions, if available, are the major instruments that allow the municipal authorities to define priorities and verify the efficiency of measures they are taking to cut the greenhouse gas emissions.

Compiling a BEI is a mandatory stage of drafting a SEAP as well as a key element of fulfilling one's obligations under the Covenant. The BEI should be incorporated into the final SEAP officially endorsed by the municipal authorities.

BUILDINGS AND EQUIPMENT/FACILITIES

1. MUNICIPALITY BUILDING EQUIPMENT/FACILITIES

The municipal existing building stock is made up of different structures over which the Municipality has a direct management. Through data furnished by the Municipality, it's possible to evaluate the following emissions:

Identification	Dimensional Data	FUEL		Energy Consumption		Certified green electricity purchases		Heat / cold thermal energy purchases		CO_{2-eq} Emission (ton/yr)		CO_{2-eq} Total Emission (ton/yr)
	Net Volume (m^3)	Consumption* (m3; litre; kg; kWh)	TYPE	Electric Energy (MWh/yr)	Fuels (MWh/yr)	% of electric energy consumption	Emission factors (t/MWh) (only for LCA approach)	Heat / cold Energy (MWh/yr)	Emission factors (t/MWh)			
			-	**10.690,30**	**42.975,65**			**0,00**		**Electric** **Fuel** **Heat/cold**	**16.120,97** **10.803,86** **0,00**	**26.924,83**
Kindergardens, nursery, elementary, middle and junior high schools		1.301.500	Natural Gas	8.225,70	12.463,16				0,23	Electric Fuel Heat/cold	12.404,36 2.517,56 0,00	14.921,91
		2.012.486	Other Bituminous Coal		14.489,90				0,23	Electric Fuel Heat/cold	0,00 4.941,06 0,00	4.941,06
Municipal buildings (offices)		167.200	Gas oil, diesel	1.137,00	1.672,00				0,23	Electric Fuel Heat/cold	1.714,60 446,42 0,00	2.161,02
		1.069.599	Natural Gas		10.242,48				0,23	Electric Fuel Heat/cold	0,00 2.068,98 0,00	2.068,98
Municipal facilities		429.000	Natural Gas	1.327,60	4.108,10				0,23	Electric Fuel Heat/cold	2.002,02 829,84 0,00	2.831,86
			-		0,00				0,23	Electric Fuel Heat/cold	0,00 0,00 0,00	0,00

2. TERTIARY BUILDING EQUIPMENT/FACILITIES

The activities in the tertiary sector are grouped in three different areas and their consumptions have been estimated by statistical data.

Identification	Dimensional Data	FUEL			Heat/cold thermal energy purchases		Consumption (MWh/yr)	CO_{2-eq} Emission (ton/yr)		CO_{2-eq} Total Emission (ton/yr)
	Net Volume (m3)	Consumption* (m3; litre; kg; kWh)	TYPE	Consumption (MWh/yr)	Heat/cold Energy (MWh/yr)	Emission factors (T/MWh)	Electric Energy (MWh/yr)			
	0,00			**464.271,90**	**100.594,00**		**65.827,66**	**Electric** **Fuel** **Heat/cold**	**99.268,10** **129.208,04** **23.054,93**	**251.531,08**
Tertiary Buildings (serviced by Zhambylskie electricheskie seti)		52.000,00	Natural Gas	497,95	424	0,23	3.828	Electric	5.772,10	5.969,87
		0,00	-	0,00				Fuel	100,59	
		0,00	-	0,00				Heat/cold	97,18	
Tertiary Buildings (serviced by TarazEnergoCenter)		12.000.000,00	Natural Gas	114.912,00	100.170	0,23	62.000	Electric	93.496,00	245.561,21
		23.928.480,00	Other Bituminous Coal	172.285,06				Fuel	129.107,46	
		17.657.689,00	Gas oil, diesel	176.576,89				Heat/cold	22.957,76	

3. RESIDENTIAL BUILDINGS

Residential building consumptions have been evaluated from statistical. This sector is the most significant with roughly 43% of the total emissions in Taraz. It is necessary to focus big efforts on it to succeed in the Covenant commitment.

Identification	Dimensional Data	FUEL			Heat/cold thermal energy purchases		Consumption (MWh/yr)	CO_{2-eq} Emission (ton/yr)		CO_{2-eq} Total Emission (ton/yr)
	Net Volume (m3)	Consumption* (m3; litre; kg; kWh)	TYPE	Consumption (MWh/yr)	Heat/cold Energy (MWh/yr)	Emission factors (T/MWh)	Electric Energy (MWh/yr)			
TOTAL	**0,00**			**678.883,56**	**125.000,00**		**163.575,00**	**Electric** **Fuel** **Heat/cold**	**246.671,10** **180.984,32** **28.648,49**	**456.303,91**
Residential Buildings		28.265.820,00	Natural Gas	270.673,49	125.000	**0,23**	163.575			
		17.420.758,73	Gas oil, diesel	174.207,59						
		32.500.345,00	Other Bituminous Coal	234.002,48						
		0,00	-	0,00						
		0,00	-	0,00						
		0,00	-	0,00						

4. MUNICIPAL PUBLIC LIGHTING

The public lighting system in 2012 made use different types of bulbs and no light flux regulators were installed.

Identification	Classification			Lighting hours* (h/yr)	Grid loss** (%)	Certified green electricity purchases		Reduction for light flux regulation*** (%)	Electric Energy Consumption [MWh/yr]	CO_{2-eq} Emission (ton/yr)
	Lamps Number	Lamp Power [Watt]	Typology			% of electric energy consumption	Emission factors (Ton/MWh) (only for LCA approach)			
TOTAL	**10.882**		**-**						**9.194,40**	**13.865,16**
174 streets 12 microdistricts 4 residential array	10.882		LED -906, energy saving -350, sodium - 9626						9.194,40	13.865,16

TRANSPORTATIONS

5. MUNICIPAL FLEET

Municipal fleet has the lower impact in terms of CO_2 emissions. Data have been directly collected from municipal registers.

Identification	Mileage [km/yr]	Energy Performance* [km/l] or [km/kg] or [km/kWh]	FUEL	Energy Consumption		$CO_{2\text{-eq}}$ Emission		$CO_{2\text{-eq}}$ Emission
				Electric Energy [MWh/yr]	Fuels [MWh/yr]	Electric Energy [ton/yr]	Fuels [ton/yr]	[ton/yr]
TOTAL				**0,00**	**687,43**	**0,00**	**178,58**	**178,58**
10 cars	300.000	10	Motor Gasoline	0,00	276,00	0,00	68,72	68,72
12 cars	240.000	14	Gas oil, diesel	0,00	171,43	0,00	45,77	45,77
4 vans	120.000	5	Gas oil, diesel	0,00	240,00	0,00	64,08	64,08

6. PUBLIC TRANSPORTATION

Data have been directly collected from the local public service.

Identification	Number of vehicles	Average vehicle mileage [km/yr]	Energy Performance* [km/l] or [km/kg] or [km/kWh]	FUEL	Energy Consumption		CO_{2-eq} Emission		CO_{2-eq} Emission
					Electric Energy [MWh/yr]	Fuels [MWh/yr]	Electric Energy [ton/yr]	Fuels [ton/yr]	[ton/yr]
TOTAL					**5.416,67**	**227.987,00**	**8.168,33**	**60.829,06**	**68.997,39**
PAZ - 3205	348	125.000	3	Gas oil, diesel	0,00	130.500,00	0,00	34.843,50	34.843,50
Shaolin, Mudan, Golden Dragon, FAW,	367	120.000	6	Gas oil, diesel	0,00	79.272,00	0,00	21.165,62	21.165,62
Mercedes - Benz	36	27.778	7	Gas oil, diesel	0,00	1.500,00	0,00	400,50	400,50
Asia, KiaKombi	30	180.000	5	Gas oil, diesel	0,00	10.800,00	0,00	2.883,60	2.883,60
Setra	18	55.556	3	Gas oil, diesel	0,00	3.500,00	0,00	934,50	934,50
LAZ - 695	5	150.000	3	Motor Gasoline	0,00	2.415,00	0,00	601,34	601,34
Trolleybus	13	125.000	0	Electric Energy	5.416,67	0,00	8.168,33	0,00	8.168,33

7. PRIVATE AND COMMERCIAL TRANSPORTATION

For this inventory have been used statistical data and local oil consumptions. Private transport is the second sector responsible for the total municipal emissions mainly due to dated vehicles circulating in Taraz.

Identification	Number of vehicles	Average vehicle mileage [km/yr]	Energy Performance* [km/l] or [km/kg] or [km/kWh]	FUEL	Energy Consumption		CO_{2-eq} Emission		CO_{2-eq} Emission
					Electric Energy [MWh/yr]	Fuels [MWh/yr]	Electric Energy [ton/yr]	Fuels [ton/yr]	[ton/yr]
TOTAL					**0,00**	**938.400,00**	**0,00**	**248.565,60**	**248.565,60**
Small vehicles	12.000	10.000	10	Motor Gasoline	0,00	110.400,00	0,00	27.489,60	27.489,60
Small vehicles	17.000	12.000	14	Gas oil, diesel	0,00	145.714,29	0,00	38.905,71	38.905,71
Commercial	4.776	100.000	7	Gas oil, diesel	0,00	682.285,71	0,00	182.170,29	182.170,29

8. LOCAL PLANTS

Locally generated heat/cold and electricity (excluding ETS plants , and all plants/units > 20 MW)	Locally generated electricity [MWh]	Energy carrier input [Natural gas in m3, solar thermal and geothermal in kWh, other fuels in kg or litre]									
		Natural Gas	-	-	-	-	-	-	-	-	-
District Heating plant(s) Zhambyl Zhylu	Heat / cold	3.826.170,00									
Other Please specify: _____											
Combined Heat and Power	Electric energy										
Other											
Total		3.826.170,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00

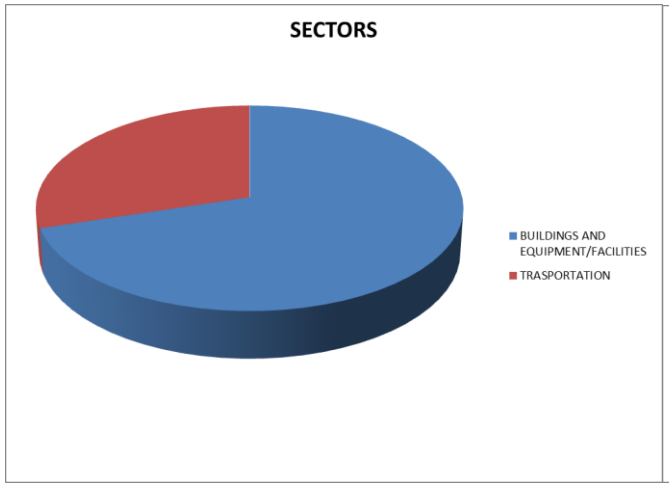
CO2 emissions related to any imported heat from outside the territory of the local autority [t] =	44.302,26
CO2 emissions related to any heat that is exported outside the territory of the local autority [t] =	0,00

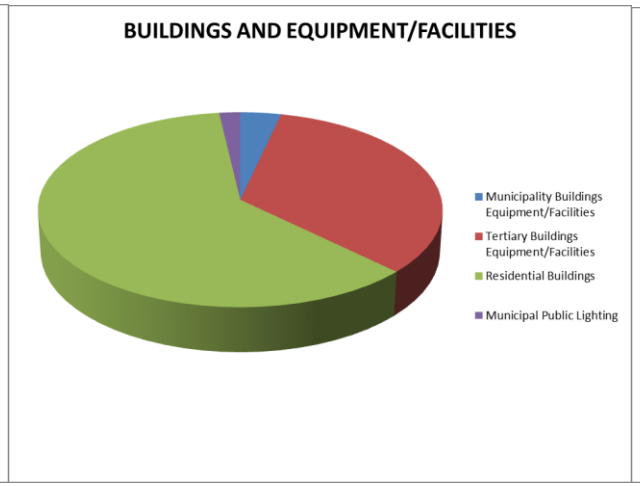
Locally generated heat/cold	Locally generated heat/cold [MWh]	Energy carrier input [MWh]									
		Natural Gas	-	-	-	-	-	-	-	-	-
Combined Heat and Power	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
District Heating plant(s) Zhambyl Zhylu	32.975,46	36.639,40	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
Other Please specify: _____	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
Total	32.975,46	36.639,40	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00

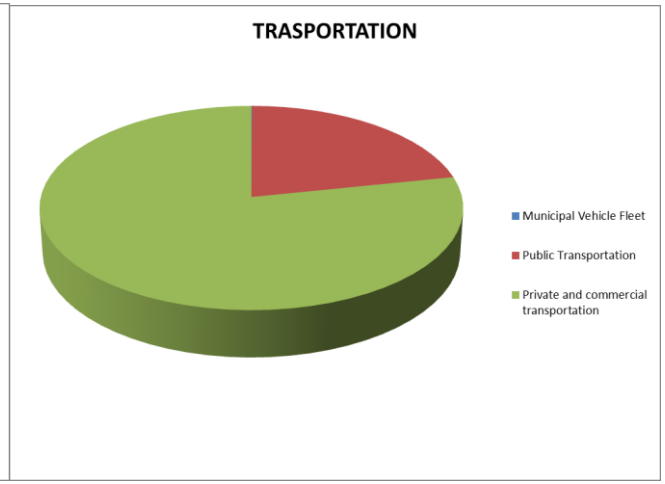
THE BASELINE EMISSION INVENTORY OF TARAZ IN 2012

Inventory year **2012**	FINAL ENERGY CONSUMPTION [MWh/yr]			CO2 EMISSIONS [t/yr]	
	Electric Energy	Fossil Fuels	Heat/cold	TOTAL	%
BUILDINGS AND EQUIPMENT/FACILITIES	**249.287,36**	**1.186.131,11**	**225.594,00**	**748.624,97**	**70,2%**
Municipality Buildings Equipment/Facilities	10.690,30	42.975,65	-	26.924,83	2,5%
Tertiary Buildings Equipment/Facilities	65.827,66	464.271,90	100.594,00	251.531,08	23,6%
Residential Buildings	163.575,00	678.883,56	125.000,00	456.303,91	42,8%
Municipal Public Lighting	9.194,40			13.865,16	1,3%
TRASPORTATION	**5.416,67**	**1.167.074,43**	-	**317.741,57**	**29,8%**
Municipal Vehicle Fleet	-	687,43		178,58	0,0%
Public Transportation	5.416,67	227.987,00		68.997,39	6,5%
Private and commercial transportation	-	938.400,00		248.565,60	23,3%
TOTAL	***254.704,02***	***2.353.205,54***	***225.594,00***	***1.066.366,54***	***100,0%***

It is evident the importance of the BUILDING AND EQUIPMENT/FACILITIES sector over the total emission inside which the *Residential Buildings* plays an important role (42,8%).
In TRANSPORTATIONS the *Private and commercial transportation* share is about 23,3%.


SECTORS
BUILDINGS AND EQUIPMENT/FACILITIES
TRASPORTATION


BUILDINGS AND EQUIPMENT/FACILITIES
Municipality Buildings Equipment/Facilities
Tertiary Buildings Equipment/Facilities
Residential Buildings
Municipal Public Lighting


TRASPORTATION
Municipal Vehicle Fleet
Public Transportation
Private and commercial transportation

ACTION PLAN

OF

TARAZ

SECTOR:
1. BUILDINGS AND EQUIPMENT/FACILITIES

FIELDS OF ACTION:
1.1. Municipality Building Equipment/Facilities
1.2. Tertiary Building Equipment/Facilities
1.3. Residential Buildings
1.4. Municipal Public Lighting

1.1 Municipality Building Equipment/Facilities

The real estate of the Municipality is roughly 2,5% of the overall emission of this sector.
The actions that will be conducted in this area involve a saving of CO2 emissions equal to 6,943 t/year.

Actions:

1.1.1 Refurbishment of municipal buildings.
1.1.2 Installation of PV panels, micro wind generators and/or solar water heating systems.

Sustainable Energy Action Plan in the Municipality of Taraz

ACTION	CODE	TITLE	EXPECTED CO_2 EMISSION REDUCTION (tons/year)
D	1.1.1	Refurbishment of municipal buildings.	6.942,8

FIELD OF ACTION	SECTOR	TYPOLOGY
BUILDINGS AND EQUIPMENT/FACILITIES	Municipality Buildings Equipment/Facilities	OC

DESCRIPTION

Municipal buildings with high energy consumption will be refurbished in order to improve their energy performance. This action includes the replacement of the fixtures, the use of sun control window films, the increment of the thermal resistance, the replacement of traditional lighting bulbs with high efficiency systems, improvement of the energy efficiency of the heating system (boiler replacement: eg. condensing boilers, modulating etc.,), the use of home automation for energy saving in absence of people and the installation of high efficiency heating systems.

CONNECTION WITH OTHER SEAP: --

CONNECTION WITH OTHER PLANS: --

IMPLEMENTATION

	ESTIMATED COST	INITIATED OR COMPLETED INVESTMENTS	YEARS								
			2012	2013	2014	2015	2016	2017	2018	2019	2020
(KZT)	100.000.000										
(EURO)	510.000						x	x	x	x	x

PAYBACK TIME OF THE INVESTMENT: n.a.

RESPONSIBLE: Municipality of Taraz - Technical Sector

OTHER ACTORS INVOLVED:

EXPECTED ENERGY SAVING (KWh/year):	kWhe	2.832.929,50
	kWht	9.110.837,17
LOCAL RENEWABLE ENERGY PRODUCTION (KWh/year):	kWhe	-
	kWht	-

OTHER EXPECTED RESULTS: --

GENERAL MEASURING INDICATORS:

Total CO_2 emissions of the Municipal Administration

Final energy consumption of the Municipal Administration

TARGET INDICATORS UNDER THE DIRECT CONTROL OF THE MUNICIPALITY:

N° of refurbished buildings

% of replaced fixtures or % of fixtures subjected to routine/emergency maintenance

N° of replaced boilers

N° of replaced bulbs

N° of building automation systems installed

Sustainable Energy Action Plan in the Municipality of Taraz			
ACTION	**CODE**	**TITLE**	**EXPECTED CO_2 EMISSION REDUCTION (tons/year)**
D	1.1.2	Installation of PV panels, micro wind generators and/or solar water heating systems	58,8
FIELD OF ACTION		**SECTOR**	**TYPOLOGY**
BUILDINGS AND EQUIPMENT/FACILITIES		Municipality Buildings Equipment/Facilities	RE

DESCRIPTION

The Municipal have appropriate areas for installing at least 30 kWp of PV panels and will also investigate on the installation of micro wind generators on the roofs of public buildings.

CONNECTION WITH OTHER SEAP: --

CONNECTION WITH OTHER PLANS: --

IMPLEMENTATION

	ESTIMATED COST	INITIATED OR COMPLETED INVESTMENTS	YEARS								
			2012	2013	2014	2015	2016	2017	2018	2019	2020
(KZT)	10.000.000										
(EURO)	51.000							x	x	x	x

PAYBACK TIME OF THE INVESTMENT: n.a.

RESPONSIBLE: Municipality of Taraz - Technical Sector

OTHER ACTORS INVOLVED:

EXPECTED ENERGY SAVING (KWh/year):	kWhe	39.000,00
	kWht	-
LOCAL RENEWABLE ENERGY PRODUCTION (KWh/year):	kWhe	-
	kWht	-

OTHER EXPECTED RESULTS: --

GENERAL MEASURING INDICATORS:

Total CO_2 emissions of the Municipal Adsministration

Final energy consumption of the Municipal Administration

TARGET INDICATORS UNDER THE DIRECT CONTROL OF THE MUNICIPALITY:

kW installed

N° of buildings involved

1.2 Tertiary Building Equipment/Facilities

These actions aim at improving the energy efficiency of the buildings/facilities for commercial, services or handcraft activities.
The CO2 emission reduction is equal to 57,314 t / year.

Actions:

1.2.1 Energy Requalification.
1.2.2 Replacement of electrical and electronic equipment with more efficient models.

Sustainable Energy Action Plan in the Municipality of Taraz			
ACTION	**CODE**	**TITLE**	**EXPECTED CO_2 EMISSION REDUCTION (tons/year)**
I	1.2.1	Energy Requalification	36.268,7
FIELD OF ACTION		**SECTOR**	**TYPOLOGY**
BUILDINGS AND EQUIPMENT/FACILITIES		Tertiary Buildings Equipment/Facilities	PDR

DESCRIPTION

The Municipality will promote energy saving technologies and small renewable energy plants in the tertiary sectors. These systems include the replacement of the fixtures, the use of sun control window films, the increment of the thermal resistance, improvement of the energy efficiency of the heating system (boiler replacement: eg. condensing boilers, modulating etc.,).

CONNECTION WITH OTHER SEAP: --

CONNECTION WITH OTHER PLANS: --

IMPLEMENTATION

	ESTIMATED COST	INITIATED OR COMPLETED INVESTMENTS	YEARS								
(KZT)	1.000.000		2012	2013	2014	2015	2016	2017	2018	2019	2020
(EURO)	5.100				x	x	x	x	x	x	x

PAYBACK TIME OF THE INVESTMENT: n.a.

RESPONSIBLE: Municipality of Taraz - Administrativel Sector

OTHER ACTORS INVOLVED: Trade associations, professional association

EXPECTED ENERGY SAVING (KWh/year):	kWhe	
	kWht	125.739.148,89
LOCAL RENEWABLE ENERGY PRODUCTION (KWh/year):	kWhe	-
	kWht	-

OTHER EXPECTED RESULTS: --

GENERAL MEASURING INDICATORS:

Total and per capita CO2 production

Total and per capita energy production

TARGET INDICATORS UNDER THE DIRECT CONTROL OF THE MUNICIPALITY:

N° of refurbished buildings

N° and typology of systems installed

Sustainable Energy Action Plan in the Municipality of Taraz

ACTION	CODE	TITLE	EXPECTED CO_2 EMISSION REDUCTION (tons/year)
I	1.2.2	Replacement of electrical and electronic equipment with more efficient models	21.044,8

FIELD OF ACTION	SECTOR	TYPOLOGY
BUILDINGS AND EQUIPMENT/FACILITIES	Tertiary Buildings Equipment/Facilities	EA

DESCRIPTION

Efficient appliances

It is a long time since these models are available on the market. Refrigerators, freezers, washing machines and dishwashers on the market are equipped with an energy label (a certification that shows the power consumption of the device and therefore its conventional energy quality). Energy labeling of household appliances, made mandatory by a Community directive, defines seven classes of energy efficiency ranging from "A" (low power) to "G" (high consumption). The efficient appliances can consume up to a third of the electricity consumed by the lower-end appliances. The choice of more efficient appliances, therefore, entails a considerable energy saving.

Lighting systems

The replacement of incandescent bulbs with low energy ones may result in a reduction of the average consumption for lighting up to 80%. The current efficient light bulbs are produced in forms that are well suited to the lamps or existing luminaires. Their higher price, which in recent years due to an increase in production has been significantly reduced, is compensated by a longer duration, on average, 10 times, compared to that of incandescent bulbs. Even the low-energy light bulbs are classified with the levels of energy efficiency from "A" to "G".

CONNECTION WITH OTHER SEAP: --

CONNECTION WITH OTHER PLANS: --

IMPLEMENTATION

	ESTIMATED COST	INITIATED OR COMPLETED INVESTMENTS	YEARS								
			2012	2013	2014	2015	2016	2017	2018	2019	2020
(KZT)	1.000.000										
(EURO)	5.100		x	x	x	x	x	x	x	x	x

PAYBACK TIME OF THE INVESTMENT: n.a.

RESPONSIBLE: Municipality of Taraz - Administrativel Sector

OTHER ACTORS INVOLVED: Trade associations, professional association

EXPECTED ENERGY SAVING (KWh/year):	kWhe	13.955.462,86
	kWht	-
LOCAL RENEWABLE ENERGY PRODUCTION (KWh/year):	kWhe	-
	kWht	-

OTHER EXPECTED RESULTS: --

GENERAL MEASURING INDICATORS:

Total and per capita CO2 production

Total and per capita energy production

TARGET INDICATORS UNDER THE DIRECT CONTROL OF THE MUNICIPALITY:

N° of appliances replaced

N° of bulbs replaced

1.3 Residential Buildings

The residential sector is the second main responsible for the overall emission in the municipality area (42.8%).
Many buildings are very old and high energy consuming. It is foreseen a development of some areas in the next years and the refurbishment of many existing buildings.
With the following actions the Municipality will try to reduce the current energy consumption and plan a sustainable development of the residential sector.
The CO2 emission reduction estimation is equal to 456,304 t / year.

Actions:

1.3.1 Regulatory requirement for the refurbishment of residential buildings.
1.3.2 Energy Requalification.
1.3.3 Replacement of electrical and electronic equipment with more efficient models.

Sustainable Energy Action Plan in the Municipality of Taraz			
ACTION	**CODE**	**TITLE**	**EXPECTED CO_2 EMISSION REDUCTION (tons/year)**
I	1.3.1	Regulatory requirement for the refurbishment of residential buildings.	n.a.
FIELD OF ACTION		**SECTOR**	**TYPOLOGY**
BUILDINGS AND EQUIPMENT/FACILITIES		Residential Buildings	OC

DESCRIPTION

The council regulations will stipulate that during the renovation of existing buildings will be necessary to improve their energy performance. For example, the exterior renovation of a building must contemplate the improvement of the thermal resistance of the facades and other structures involved, and any action on the heating system will include the use of thermostatic valves and/or other systems.

CONNECTION WITH OTHER SEAP: --

CONNECTION WITH OTHER PLANS: --

IMPLEMENTATION

	ESTIMATED COST	INITIATED OR COMPLETED INVESTMENTS	YEARS								
			2012	2013	2014	2015	2016	2017	2018	2019	2020
(KZT)											
(EURO)							x	x	x	x	x

PAYBACK TIME OF THE INVESTMENT: n.a.

RESPONSIBLE: Municipality of Taraz - Technical Sector

OTHER ACTORS INVOLVED: Citizens, Professional associations

EXPECTED ENERGY SAVING (KWh/year):	kWhe	n.a.
	kWht	n.a.
LOCAL RENEWABLE ENERGY PRODUCTION (KWh/year):	kWhe	n.a.
	kWht	n.a.

OTHER EXPECTED RESULTS: --

GENERAL MEASURING INDICATORS:

Total and per capita CO2 production

Total and per capita energy production

TARGET INDICATORS UNDER THE DIRECT CONTROL OF THE MUNICIPALITY:

Approval of the new building code

N° of changes for RES and RUE

Sustainable Energy Action Plan in the Municipality of Taraz			
ACTION	**CODE**	**TITLE**	**EXPECTED CO_2 EMISSION REDUCTION (tons/year)**
I	1.3.2	Energy Requalification	48.357,2

FIELD OF ACTION	**SECTOR**	**TYPOLOGY**
BUILDINGS AND EQUIPMENT/FACILITIES	Residential Buildings	PDR

DESCRIPTION

The Municipality will promote energy saving technologies and small renewable energy plants in the residential sectors. These systems include the replacement of the fixtures, the use of sun control window films, the increment of the thermal resistance, improvement of the energy efficiency of the heating system (boiler replacement: eg. condensing boilers, modulating etc.,), photovoltaic panels, small wind generators etc.

CONNECTION WITH OTHER SEAP: --

CONNECTION WITH OTHER PLANS: --

IMPLEMENTATION

	ESTIMATED COST	INITIATED OR COMPLETED INVESTMENTS	YEARS								
			2012	2013	2014	2015	2016	2017	2018	2019	2020
(KZT)											
(EURO)								x	x	x	x

PAYBACK TIME OF THE INVESTMENT: n.a.

RESPONSIBLE: Municipality of Taraz - Technical Sector

OTHER ACTORS INVOLVED: Citizens, Professional associations

EXPECTED ENERGY SAVING (KWh/year):	kWhe	-
	kWht	195.986.812,82
LOCAL RENEWABLE ENERGY PRODUCTION (KWh/year):	kWhe	1.733.895,00
	kWht	3.598.082,89

OTHER EXPECTED RESULTS: --

GENERAL MEASURING INDICATORS:

Total and per capita CO2 production

Total and per capita energy production

TARGET INDICATORS UNDER THE DIRECT CONTROL OF THE MUNICIPALITY:

N° of refurbished buildings

% of replaced fixtures or % of fixtures subjected to routine/emergency maintenance

N° of replaced boilers

N° of replaced bulbs

N° of building automation systems installed

Sustainable Energy Action Plan in the Municipality of Taraz

ACTION	CODE	TITLE	EXPECTED CO_2 EMISSION REDUCTION (tons/year)
I	1.3.3	Replacement of electrical and electronic equipment with more efficient models	52.294,3

FIELD OF ACTION	SECTOR	TYPOLOGY
BUILDINGS AND EQUIPMENT/FACILITIES	Residential Buildings	EA

DESCRIPTION

Efficient appliances

It is a long time since these models are available on the market. Refrigerators, freezers, washing machines and dishwashers on the market are equipped with an energy label (a certification that shows the power consumption of the device and therefore its conventional energy quality). Energy labeling of household appliances, made mandatory by a Community directive, defines seven classes of energy efficiency ranging from "A" (low power) to "G" (high consumption). The efficient appliances can consume up to a third of the electricity consumed by the lower-end appliances. The choice of more efficient appliances, therefore, entails a considerable energy saving.

Lighting systems

The replacement of incandescent bulbs with low energy ones may result in a reduction of the average consumption for lighting up to 80%. The current efficient light bulbs are produced in forms that are well suited to the lamps or existing luminaires. Their higher price, which in recent years due to an increase in production has been significantly reduced, is compensated by a longer duration, on average, 10 times, compared to that of incandescent bulbs. Even the low-energy light bulbs are classified with the levels of energy efficiency from "A" to "G".

CONNECTION WITH OTHER SEAP: --

CONNECTION WITH OTHER PLANS: --

IMPLEMENTATION

	ESTIMATED COST	INITIATED OR COMPLETED INVESTMENTS	YEARS								
			2012	2013	2014	2015	2016	2017	2018	2019	2020
(KZT)											
(EURO)							x	x	x	x	x

PAYBACK TIME OF THE INVESTMENT: n.a.

RESPONSIBLE: Municipality of Taraz - Technical Sector

OTHER ACTORS INVOLVED: Citizens, Professional associations

EXPECTED ENERGY SAVING (KWh/year):	kWhe	34.677.900,00
	kWht	-
LOCAL RENEWABLE ENERGY PRODUCTION (KWh/year):	kWhe	-
	kWht	-

OTHER EXPECTED RESULTS: --

GENERAL MEASURING INDICATORS:

Total and per capita CO2 production

Total and per capita energy production

TARGET INDICATORS UNDER THE DIRECT CONTROL OF THE MUNICIPALITY:

N° of appliances replaced

N° of bulbs replaced

1.4 Municipal Public Lighting

The CO2 reduction estimation with respect to the BAU scenario is equal to 3,120 t/year.

Actions:

1.4.1 Replacement of mercury vapor lamps with high-efficiency lamps and installation of luminous flux regulators.

Sustainable Energy Action Plan in the Municipality of Taraz			
ACTION	**CODE**	**TITLE**	**EXPECTED CO_2 EMISSION REDUCTION (tons/year)**
D	1.4.1	Replacement of mercury vapor lamps with high-efficiency lamps and installation of luminous flux regulators	3.120,2
FIELD OF ACTION		**SECTOR**	**TYPOLOGY**
BUILDINGS AND EQUIPMENT/FACILITIES		Municipal Public Lighting	OC

DESCRIPTION

The public lighting system of Taraz consists of 10.882 lamps. In order to reduce the committed power capacity and the overall consumption, it is expected to develop the following actions:
- Replacement of old technology lamps with high efficiency lamps, guaranteeing: electrical load reduction and increase of the luminous flux, improvement of the overall performance of the distribution network, increase of the power factor, a substantial reduction of the lamp replacement costs (due to an average lamp life longer than that of the typology installed);
- Installation of electronic flux regulators for public lighting plants.

CONNECTION WITH OTHER SEAP: --

CONNECTION WITH OTHER PLANS: --

IMPLEMENTATION

	ESTIMATED COST	INITIATED OR COMPLETED INVESTMENTS	YEARS								
			2012	2013	2014	2015	2016	2017	2018	2019	2020
(KZT)	58.000.000										
(EURO)	295.800								x	x	x

PAYBACK TIME OF THE INVESTMENT: n.a.

RESPONSIBLE: Municipality of Taraz - Technical Sector

OTHER ACTORS INVOLVED:

EXPECTED ENERGY SAVING (KWh/year):	kWhe	2.069.089,39
	kWht	-
LOCAL RENEWABLE ENERGY PRODUCTION (KWh/year):	kWhe	-
	kWht	-

OTHER EXPECTED RESULTS: --

GENERAL MEASURING INDICATORS:

Total CO_2 emissions of the Municipal Administration
Final energy consumption of the Municipal Administration

TARGET INDICATORS UNDER THE DIRECT CONTROL OF THE MUNICIPALITY:

N° of bulbs replaced
N° electronic flux regulators installed

SECTOR:
2. TRASPORTATION

FIELDS OF ACTION:
2.1. Municipal Vehicle Fleet
2.2 Private and commercial transportation

2.1 Municipal Vehicle Fleet

To reduce the consumption it is important not only to replace the vehicles at the end of their live with more efficient ones, but also to spread a sustainable driving style.
The CO2 reduction estimation is equal to 43.54 t/yr.

Actions:

2.1.1 Eco-driving courses
2.1.2 Replacement of end of life vehicles with low-emission vehicles

Sustainable Energy Action Plan in the Municipality of Taraz

ACTION	CODE	TITLE	EXPECTED CO_2 EMISSION REDUCTION (tons/year)
D	2.1.1	Eco-driving courses	15,1

FIELD OF ACTION	SECTOR	TYPOLOGY
TRASPORTATION	Municipal Vehicle Fleet	OC

DESCRIPTION

The realization of eco-driving courses will allow to save 10% of the normal fuel consumption. The courses will be general and specific for particular types of vehicles, aiming at spreading a sustainable driving style by adopting a conscious driving, safe and respectful of the parameters in which the internal combustion engine works better (adjust the tire pressure, drive safely in adverse weather conditions, keep the windows closed driving at high speed, etc.). The courses will be organized by the technical sector of the Municipality of Taraz.

CONNECTION WITH OTHER SEAP: --

CONNECTION WITH OTHER PLANS: --

IMPLEMENTATION

	ESTIMATED COST	INITIATED OR COMPLETED INVESTMENTS	YEARS								
			2012	2013	2014	2015	2016	2017	2018	2019	2020
(KZT)	1.000.000										
(EURO)	5.100						x	x	x	x	x

PAYBACK TIME OF THE INVESTMENT: n.a.

RESPONSIBLE: Municipality of Taraz - Technical Sector

OTHER ACTORS INVOLVED:

EXPECTED ENERGY SAVING (KWh/year):	kWhe	-
	kWht	58.293,94
LOCAL RENEWABLE ENERGY PRODUCTION (KWh/year):	kWhe	-
	kWht	-

OTHER EXPECTED RESULTS: --

GENERAL MEASURING INDICATORS:

Total CO_2 emissions of the Municipal Administration

Final energy consumption of the Municipal Administration

TARGET INDICATORS UNDER THE DIRECT CONTROL OF THE MUNICIPALITY:

N° of courses

Sustainable Energy Action Plan in the Municipality of Taraz

ACTION	CODE	TITLE	EXPECTED CO_2 EMISSION REDUCTION (tons/year)
D	2.1.2	Replacement of end of life vehicles with low-emission vehicles	28,4

FIELD OF ACTION	SECTOR	TYPOLOGY
TRASPORTATION	Municipal Vehicle Fleet	OC

DESCRIPTION

The vehicles of the municipal fleet will be replaced with other defined "green vehicles" (the best European vehicle category at the time of purchase) with low emission and better energy performance.

CONNECTION WITH OTHER SEAP: --

CONNECTION WITH OTHER PLANS: --

IMPLEMENTATION

	ESTIMATED COST	INITIATED OR COMPLETED INVESTMENTS	YEARS								
			2012	2013	2014	2015	2016	2017	2018	2019	2020
(KZT)	50.000.000										
(EURO)	255.000							x	x	x	x

PAYBACK TIME OF THE INVESTMENT: n.a.

RESPONSIBLE: Municipality of Taraz - Technical Sector

OTHER ACTORS INVOLVED:

EXPECTED ENERGY SAVING (KWh/year):	kWhe	-
	kWht	109.301,14
LOCAL RENEWABLE ENERGY PRODUCTION (KWh/year):	kWhe	-
	kWht	-

OTHER EXPECTED RESULTS: --

GENERAL MEASURING INDICATORS:

Total CO_2 emissions of the Municipal Administration

Final energy consumption of the Municipal Administration

TARGET INDICATORS UNDER THE DIRECT CONTROL OF THE MUNICIPALITY:

N° of cars replaced

2.2 Public Transportation

The Municipality will extend the same actions for the municipal fleet and arrange eco-driving courses for the drivers of public transportations agencies.
The CO2 reduction estimation is equal to 16,822.

Actions:

2.2.1 Eco-driving courses for public transportation drivers
2.2.2 Replacement of end of life public transportation vehicles with low-emission vehicles

Sustainable Energy Action Plan in the Municipality of Taraz			
ACTION	**CODE**	**TITLE**	**EXPECTED CO_2 EMISSION REDUCTION (tons/year)**
I	2.2.1	Eco-driving courses for public transportation drivers	3.656,9
FIELD OF ACTION		**SECTOR**	**TYPOLOGY**
TRASPORTATION		Public Transportation	PDR

DESCRIPTION

The realization of eco-driving courses will allow to save 10% of the normal fuel consumption. The courses will specific for drivers of different types of public transportation vehicles, aiming at spreading a sustainable driving style by adopting a conscious driving. The courses will be organized by the technical sector of the Municipality of Taraz.

CONNECTION WITH OTHER SEAP: --

CONNECTION WITH OTHER PLANS: --

IMPLEMENTATION

	ESTIMATED COST	INITIATED OR COMPLETED INVESTMENTS	YEARS								
(KZT)	1.000.000		2012	2013	2014	2015	2016	2017	2018	2019	2020
(EURO)	5.100						x	x	x	x	x

PAYBACK TIME OF THE INVESTMENT: n.a.

RESPONSIBLE: Municipality of Taraz - Technical Sector

OTHER ACTORS INVOLVED: Trasportation Service Agencies

EXPECTED ENERGY SAVING (KWh/year):	kWhe	-
	kWht	12.083.311
LOCAL RENEWABLE ENERGY PRODUCTION (KWh/year):	kWhe	-
	kWht	-

OTHER EXPECTED RESULTS: --

GENERAL MEASURING INDICATORS:

Total CO_2 emissions of the Municipal Adsministration

Final energy consumption of the Municipal Administration

TARGET INDICATORS UNDER THE DIRECT CONTROL OF THE MUNICIPALITY:

N° of courses

Sustainable Energy Action Plan in the Municipality of Taraz

ACTION	CODE	TITLE	EXPECTED CO_2 EMISSION REDUCTION (tons/year)
I	2.2.2	Replacement of end of life public transportation vehicles with low-emission vehicles	13.164,7

FIELD OF ACTION	SECTOR	TYPOLOGY
TRASPORTATION	Public Transportation	PDR

DESCRIPTION

The vehicles of thepublic transportation fleets will be replaced with other defined "green vehicles" (the best European vehicle category at the time of purchase) with low-emission and better energy performance.

CONNECTION WITH OTHER SEAP: --

CONNECTION WITH OTHER PLANS: --

IMPLEMENTATION

	ESTIMATED COST	INITIATED OR COMPLETED INVESTMENTS	YEARS								
			2012	2013	2014	2015	2016	2017	2018	2019	2020
(KZT)											
(EURO)							x	x	x	x	x

PAYBACK TIME OF THE INVESTMENT: n.a.

RESPONSIBLE: Municipality of Taraz - Technical Sector

OTHER ACTORS INVOLVED: Trasportation Service Agencies

EXPECTED ENERGY SAVING (KWh/year):	kWhe	114.833
	kWht	43.499.920
LOCAL RENEWABLE ENERGY PRODUCTION (KWh/year):	kWhe	-
	kWht	-

OTHER EXPECTED RESULTS: --

GENERAL MEASURING INDICATORS:

Total CO_2 emissions of the Municipal Adsministration
Final energy consumption of the Municipal Administration

TARGET INDICATORS UNDER THE DIRECT CONTROL OF THE MUNICIPALITY:

N° of vehicles replaced

2.3 Private and commercial transportation

The Municipality will extend the same actions for the municipal fleet and arrange eco-driving courses for the citizens.
The CO2 reduction estimation is equal to 55,331.

Actions:

2.3.1 Eco-driving courses for citizens
2.3.2 Replacement of end of life vehicles with low-emission vehicles.

Sustainable Energy Action Plan in the Municipality of Taraz			
ACTION	**CODE**	**TITLE**	**EXPECTED CO_2 EMISSION REDUCTION (tons/year)**
I	2.3.1	Eco-driving courses for citizens	13.174,0

FIELD OF ACTION	**SECTOR**	**TYPOLOGY**
TRASPORTATION	Private and commercial transportation	EA

DESCRIPTION

The realization of eco-driving courses will allow to save 10% of the normal fuel consumption. The courses will be general and specific for particular types of vehicles, aiming at spreading a sustainable driving style by adopting a conscious driving, safe and respectful of the parameters in which the internal combustion engine works better (adjust the tire pressure, drive safely in adverse weather conditions, keep the windows closed driving at high speed, etc.). The courses will be organized by the technical sector of the Municipality of Taraz.

CONNECTION WITH OTHER SEAP: --

CONNECTION WITH OTHER PLANS: --

IMPLEMENTATION

	ESTIMATED COST	INITIATED OR COMPLETED INVESTMENTS	YEARS								
(KZT)	2.000.000		2012	2013	2014	2015	2016	2017	2018	2019	2020
(EURO)	10.200						x	x	x	x	x

PAYBACK TIME OF THE INVESTMENT: n.a.

RESPONSIBLE: Municipality of Taraz - Technical Sector

OTHER ACTORS INVOLVED: Citizens

EXPECTED ENERGY SAVING (KWh/year):	kWhe	-
	kWht	49.735.200
LOCAL RENEWABLE ENERGY PRODUCTION (KWh/year):	kWhe	-
	kWht	-

OTHER EXPECTED RESULTS: --

GENERAL MEASURING INDICATORS:

Total and per capita CO2 production

Total and per capita energy production

TARGET INDICATORS UNDER THE DIRECT CONTROL OF THE MUNICIPALITY:

N° of courses

N° of participants

Sustainable Energy Action Plan in the Municipality of Taraz			
ACTION	**CODE**	**TITLE**	**EXPECTED CO_2 EMISSION REDUCTION (tons/year)**
I	2.3.2	Replacement of end of life vehicles with low-emission vehicles	42.156,7
FIELD OF ACTION		**SECTOR**	**TYPOLOGY**
TRASPORTATION		Private and commercial transportation	EA

DESCRIPTION

The vehicles of private and commercial transportation will be gradually replaced with other designed with new technologies. This process will lead to a natural reduction of CO2 emissions.
Considering that at the time being the largest part of the vehicles are highly dated, it is realistic to estimate a total CO2 reduction not lower than 12% of the emissions evaluated at the Baseline year.

CONNECTION WITH OTHER SEAP: --

CONNECTION WITH OTHER PLANS: --

IMPLEMENTATION

	ESTIMATED COST	INITIATED OR COMPLETED INVESTMENTS	YEARS								
(KZT)			2012	2013	2014	2015	2016	2017	2018	2019	2020
(EURO)							x	x	x	x	x

PAYBACK TIME OF THE INVESTMENT: n.a.

RESPONSIBLE: Municipality of Somoniyon - Technical Sector

OTHER ACTORS INVOLVED: Citizens

EXPECTED ENERGY SAVING (KWh/year):	kWhe	-
	kWht	159.152.640
LOCAL RENEWABLE ENERGY PRODUCTION (KWh/year):	kWhe	-
	kWht	-

OTHER EXPECTED RESULTS: --

GENERAL MEASURING INDICATORS:

Total and per capita CO2 production

Total and per capita energy production

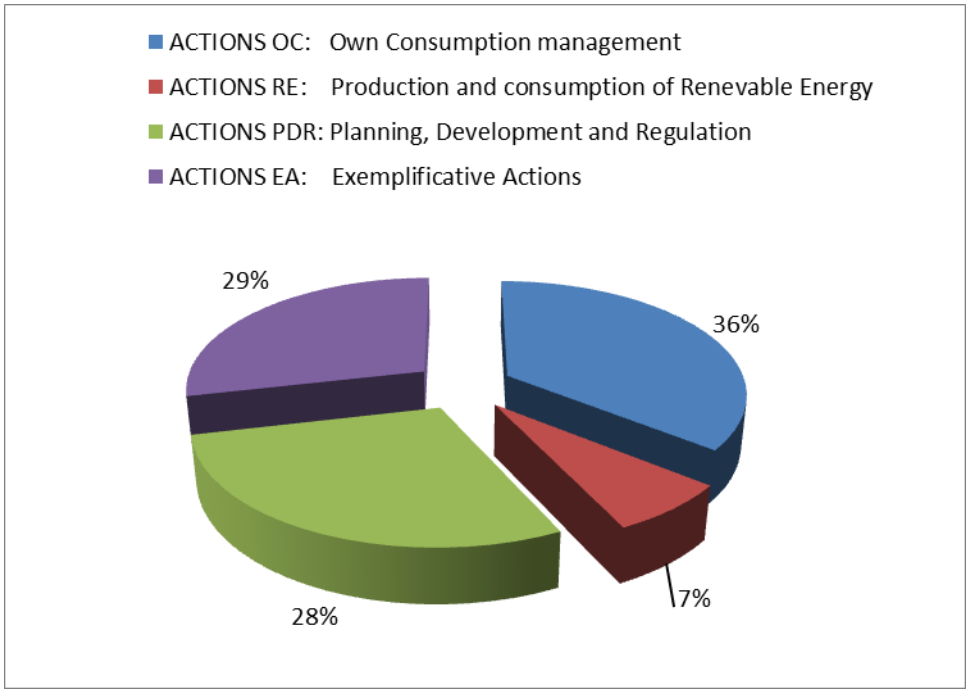
TARGET INDICATORS UNDER THE DIRECT CONTROL OF THE MUNICIPALITY:

N° of vehicles replaced

SUMMARY OF THE ACTIONS

The Municipality will develop 14 actions (5 Direct and 9 Indirect). The total cost of the action plan for the Municipality is roughly 1,142,400 Euros.

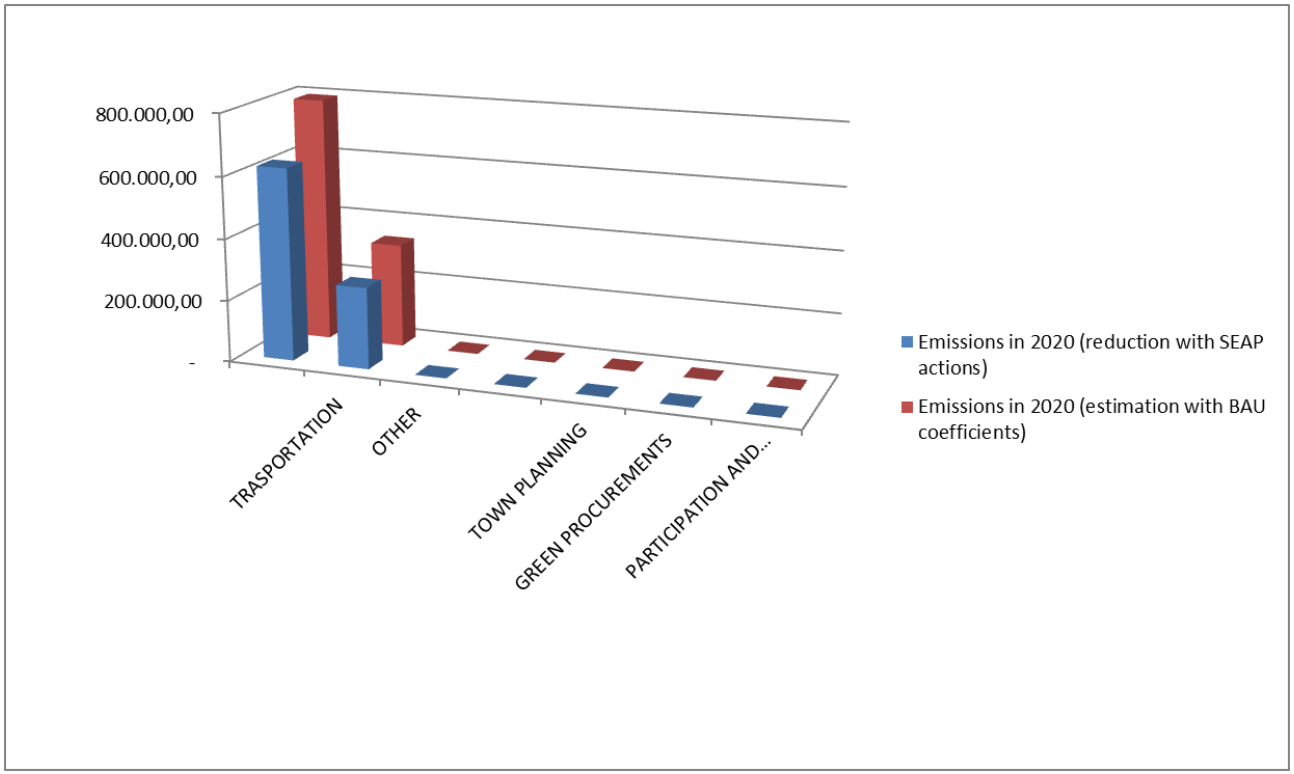
TYPE	*Number*	*%*
ACTIONS OC: Own Consumption management	5	36
ACTIONS RE: Production and consumption of Renevable Energy	1	7
ACTIONS PDR: Planning, Development and Regulation	4	29
ACTIONS EA: Exemplificative Actions	4	29
	14	100



ACTION CODE	*FIELD OF ACTION*	*SECTOR*	*TITLE*	EXPECTED CO2 EMISSION REDUCTION (tons/year)	(KZT)	(EURO)
1.1.1	BUILDINGS AND EQUIPMENT/FACILITIES	Municipality Buildings Equipment/Facilities	Refurbishment of municipal buildings.	6.942,75	100.000.000,00	510.000,00
1.1.2	BUILDINGS AND EQUIPMENT/FACILITIES	Municipality Buildings Equipment/Facilities	Installation of PV panels, micro wind generators and/or solar water heating systems	58,81	10.000.000,00	51.000,00
1.2.1	BUILDINGS AND EQUIPMENT/FACILITIES	Tertiary Buildings Equipment/Facilities	Energy Requalification	36.268,68	1.000.000,00	5.100,00
1.2.2	BUILDINGS AND EQUIPMENT/FACILITIES	Tertiary Buildings Equipment/Facilities	Replacement of electrical and electronic equipment with more efficient models	21.044,84	1.000.000,00	5.100,00
1.3.1	BUILDINGS AND EQUIPMENT/FACILITIES	Residential Buildings	Regulatory requirement for the refurbishment of residential buildings.	n.a.	-	
1.3.2	BUILDINGS AND EQUIPMENT/FACILITIES	Residential Buildings	Energy Requalification	48.357,16	-	
1.3.3	BUILDINGS AND EQUIPMENT/FACILITIES	Residential Buildings	Replacement of electrical and electronic equipment with more efficient models	52.294,27	-	
1.4.1	BUILDINGS AND EQUIPMENT/FACILITIES	Municipal Public Lighting	Replacement of mercury vapor lamps with high-efficiency lamps and installation of luminous flux regulators	3.120,19	58.000.000,00	295.800,00
2.1.1	TRASPORTATION	Municipal Vehicle Fleet	Eco-driving courses	15,14	1.000.000,00	5.100,00
2.1.2	TRASPORTATION	Municipal Vehicle Fleet	Replacement of end of life vehicles with low-emission vehicles	28,39	50.000.000,00	255.000,00
2.2.1	TRASPORTATION	Public Transportation	Eco-driving courses for public transportation drivers	3.656,86	1.000.000,00	5.100,00
2.2.2	TRASPORTATION	Public Transportation	Replacement of end of life public transportation vehicles with low-emission vehicles	13.164,70	-	
2.2.1	TRASPORTATION	Private and commercial transportation	Eco-driving courses for citizens	13.173,98	2.000.000,00	10.200,00
2.2.2	TRASPORTATION	Private and commercial transportation	Replacement of end of life vehicles with low-emission vehicles	42.156,73	-	
TOTAL				**240.282,51**	**224.000.000,00**	**1.142.400,00**

ACTION CODE	*FIELD OF ACTION*	*SECTOR*	*TITLE*	EXPECTED ENERGY SAVING (KWh/year)		LOCAL RENEWABLE ENERGY PRODUCTION (KWh/year)	
1.1.1	BUILDINGS AND EQUIPMENT/FACILITIES	Municipality Buildings Equipment/Facilities	Refurbishment of municipal buildings.	2.832.929,50 9.110.837,17	KWhe / anno KWht / anno	- -	KWhe / anno KWht / anno
1.1.2	BUILDINGS AND EQUIPMENT/FACILITIES	Municipality Buildings Equipment/Facilities	Installation of PV panels, micro wind generators and/or solar water heating systems	39.000,00 -	KWhe / anno KWht / anno	- -	KWhe / anno KWht / anno
1.2.1	BUILDINGS AND EQUIPMENT/FACILITIES	Tertiary Buildings Equipment/Facilities	Energy Requalification	0,00 125.739.148,89	KWhe / anno KWht / anno	- -	KWhe / anno KWht / anno
1.2.2	BUILDINGS AND EQUIPMENT/FACILITIES	Tertiary Buildings Equipment/Facilities	Replacement of electrical and electronic equipment with more efficient models	13.955.462,86 -	KWhe / anno KWht / anno	- -	KWhe / anno KWht / anno
1.3.1	BUILDINGS AND EQUIPMENT/FACILITIES	Residential Buildings	Regulatory requirement for the refurbishment of residential buildings.	n.a. n.a.	KWhe / anno KWht / anno	n.a. n.a.	KWhe / anno KWht / anno
1.3.2	BUILDINGS AND EQUIPMENT/FACILITIES	Residential Buildings	Energy Requalification	- 195.986.812,82	KWhe / anno KWht / anno	1.733.895,00 3.598.082,89	KWhe / anno KWht / anno
1.3.3	BUILDINGS AND EQUIPMENT/FACILITIES	Residential Buildings	Replacement of electrical and electronic equipment with more efficient models	34.677.900,00 -	KWhe / anno KWht / anno	- -	KWhe / anno KWht / anno
1.4.1	BUILDINGS AND EQUIPMENT/FACILITIES	Municipal Public Lighting	Replacement of mercury vapor lamps with high-efficiency lamps and installation of luminous flux regulators	2.069.089,39 -	KWhe / anno KWht / anno	- -	KWhe / anno KWht / anno
2.1.1	TRASPORTATION	Municipal Vehicle Fleet	Eco-driving courses	- 58.293,94	KWhe / anno KWht / anno	- -	KWhe / anno KWht / anno
2.1.2	TRASPORTATION	Municipal Vehicle Fleet	Replacement of end of life vehicles with low-emission vehicles	- 109.301,14	KWhe / anno KWht / anno	- -	KWhe / anno KWht / anno
2.2.1	TRASPORTATION	Public Transportation	Eco-driving courses for public transportation drivers	- 12.083.311,00	KWhe / anno KWht / anno	- -	KWhe / anno KWht / anno
2.2.2	TRASPORTATION	Public Transportation	Replacement of end of life public transportation vehicles with low-emission vehicles	114.833,33 43.499.919,60	KWhe / anno KWht / anno	- -	KWhe / anno KWht / anno
2.2.1	TRASPORTATION	Private and commercial transportation	Eco-driving courses for citizens	- 49.735.200,00	KWhe / anno KWht / anno	- -	KWhe / anno KWht / anno
2.2.2	TRASPORTATION	Private and commercial transportation	Replacement of end of life vehicles with low-emission vehicles	- 159.152.640,00	KWhe / anno KWht / anno	- -	KWhe / anno KWht / anno
TOTAL				**53.689.215,08** **595.475.464,57**	**KWhe / anno** **KWht / anno**	**1.733.895,00** **3.598.082,89**	**KWhe / anno** **KWht / anno**

INVENTORY YEAR 2012	**EMISSIONS IN THE INVENTORY YEAR 2012**	**EMISSIONS IN 2020 (ESTIMATION WITH BAU COEFFICIENTS)**	**ESTIMATIONS OF CO_2 EMISSION REDUCTION IN 2020**	**CO_2 REDUCTION (BAU/absolu.red. Scenario)**
	[ton/year]	**[ton/year]**	**[ton/year]**	**[%]**
BUILDINGS AND EQUIPMENT/FACILITIES	748.624,97	793.542,47	168.086,70	21,18
Municipality Buildings Equipment/Facilities	26.924,83	28.540,32	7.001,56	24,53
Tertiary Buildings Equipment/Facilities	251.531,08	266.622,94	57.313,51	21,50
Residential Buildings	456.303,91	483.682,14	100.651,44	20,81
Municipal Public Lighting	13.865,16	14.697,06	3.120,19	21,23
TRASPORTATION	317.741,57	336.806,06	72.195,80	21,44
Municipal Vehicle Fleet	178,58	189,29	43,54	23,00
Public Transportation	68.997,39	73.137,24	16.821,56	23,00
Private and commercial transportation	248.565,60	263.479,54	55.330,70	21,00
TOTAL	***1.066.366,54***	***1.130.348,53***	***240.282,51***	***21,26***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TRASPORTATION
OTHER
TOWN PLANNING
GREEN PROCUREMENTS
PARTICIPATION AND...
Emissions in 2020 (reduction with SEAP actions)
Emissions in 2020 (estimation with BAU coefficients)