Annex
to the Resolution of Odessa City Council
Date 07.12.2016.
No.1339-VII

SUSTAINABLE ENERGY ACTION PLAN OF ODESSA UNTIL 2030

Odessa – 2016

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INTRODUCTION

The world is changing. The fact that the leaders of 150 states came to the Climate Summit in Paris proves not only the seriousness of the problem but also the desire to find the way out of the situation that threatens the humankind.

On 12 December 2015, a document was posted on the UN official website, which had been approved by the member states. It is this Agreement that will replace the Kyoto Protocol after 2020 – the international agreement that until recently was the only one to require the world's developed nations to reduce greenhouse emissions.

Today, the provisions of the new Agreement have only been fixed on paper. They will need to be implemented within the next five years. The new agreement's main goal is to keep the increase of the average temperature in the world within 2° C and try to reduce it to 1.5° C. In the opinion of Ms. Iryna Stavchuk, however, this plan is not realistic as the plans proposed by the parties with regard to the emission reduction could in aggregate hold the global warming within 3° C.

Even if the parties resume their plans after the Paris Summit in accordance with the provisions of the new Agreement the temperature increase by at least two degrees would have serious consequences for millions of people.

Ukraine promised not to exceed the greenhouse emissions over 60% of the 1990 level within the next 15 years. In the opinion of specialists, that decision is questionable as Ukraine releases currently only about 40% of gases of the 1990 volume due to a

drastic decrease of the number of industrial enterprises in Ukraine. That is, if today's level of emissions is 100% the plan for Ukraine means plus 43% to this level.

1. World climate changes – Context for Odessa

Research proves that Ukrainian climate has been changing during the last decades (temperature and some other meteorological parameters differ from the climate normal values) and according to the modeling results the air temperature in Ukraine's territory will continue growing in the future and the annual precipitation intensity will be changing. Combination of negative consequences of urbanization and climate changes observed in large cities create a direct threat for the environmental, economic and social stability both globally and in individual countries. Intensification of the climate change symptoms and analysis of their negative impact in cities prove that climate changes cause specific threats in cities that are not typical for other types of populated areas.

For the city of Odessa, climate changes are not a distant or unclear phenomenon. The city is located at the sea coast and, therefore, automatically falls under the highest group of risk. This is shown by National Geographic in its new map of the world[1].

The sea level increase is not the only problem. Changes in the nature start causing a significant influence on people and economy. For the last half century, the number of natural disasters connected with the weather grew more than thrice. The insurance industry assesses potential economic losses from global warming to be hundreds of billions of dollars annually. The experts of the World Health Organization estimate that natural catastrophes take lives of 60 thousand people annually, mainly in the developing countries. For that very reason, reduction of energy consumption and, consequently, greenhouse gas emissions must become a priority goal for the city of Odessa.

2. Odessa Energy Strategy until 2030

2.1. Energy consumption

Odessa's energy vision until 2030 is a system of strategic decisions, goals, objectives and actions of the stakeholders, mainly, the City Administration, in the area of municipal energy and related sectors.

With the view of financial restrictions in Ukraine, the energy policy in the nearest future should be focused on the improvement of the energy efficiency level in the energy and housing/utility sectors. The priority tasks should be improvement of efficiency of the use of energy resources by the energy consuming installations,

systems of transport and energy supply, in buildings and at industrial enterprises. It is important to complete installation of equipment for metering of the supply and consumption of energy resources and services, institutionalization of ownership (management) for multi-family residential buildings and receipt of investments for energy efficiency improvement from state-owned and private banks.

Development of financial mechanisms for stimulation of energy efficiency in the sectors of indirect impact should become a priority task for relevant services of the City Council. Rather than the net saving of energy resources, all benefits from energy efficiency must be further estimated taking into consideration the added value of the product.

The main goal of Odessa's energy vision until 2030 is to reduce energy consumption in the city by 40% compared to the baseline year of 2008 (in compliance with the goals set by the European Union). Within the framework of achievement of this goal, specific objectives are envisaged (Graph 1).

Percentage of losses in the heating network **shall not exceed 10%**	Specific consumption for generation of heat by the boiler stations **shall not exceed 145 kgoe/GCal**
Specific consumption for heating of buildings **shall not exceed 80 kW*hour*m2/year**	The share of renewable energy sources in the gross end consumption of energy **at least 20%**

Graph 1. Strategic objectives of Odessa until 2030.

For the purposes of compliance with the obligations undertaken as part of the European initiative of the Covenant of Mayors, the interim goals allow reducing energy consumption by 20% and greenhouse gas emissions into the atmosphere by 20% by the year 2020. In pursuance of these goals, certain organizational, educational and technical measures have been set.

The top-priority objective for the compliance with the obligations undertaken is adaptation of the organizational and management structure in order to enable collection, storage and analysis of information on energy consumption and accompanying factors in the buildings, estimation of the normative values of consumption of energy resources for each building, evaluating the energy saving potential, selecting and implementing energy saving measures and controlling the results obtained. Establishment of an energy management unit in the city started as a parallel process with the development of the Sustainable Energy Action Plan and the unit should become fully operational by 1 January 2017.

2.2. Renewable energy sources

In addition to the comprehensive development and application of energy saving technologies, equipment, materials and organization of production, an important factor within the aggregate of energy efficiency measures should be the large-scale involvement into the fuel and energy balance of renewables and other energy sources that are not traditional for today's energy sector.

Increase of the level of Odessa's self-provision with energy due to introduction of technologies utilizing non-traditional and renewable energy sources and alternative fuels (RES), to a significant extent, means the reduction of dependence of the municipal economy upon import of energy resources.

According to the optimistic forecasts of the development of the world economy until 2050 taking into account energy saving, the world energy consumption will be about 21.5 billion tons of reference fuel, and the RES share will reach 40%. As a rule, the share of alternative types of liquid and gaseous fuels is 20% to 50% of the total use of non-traditional and renewable energy in different countries.

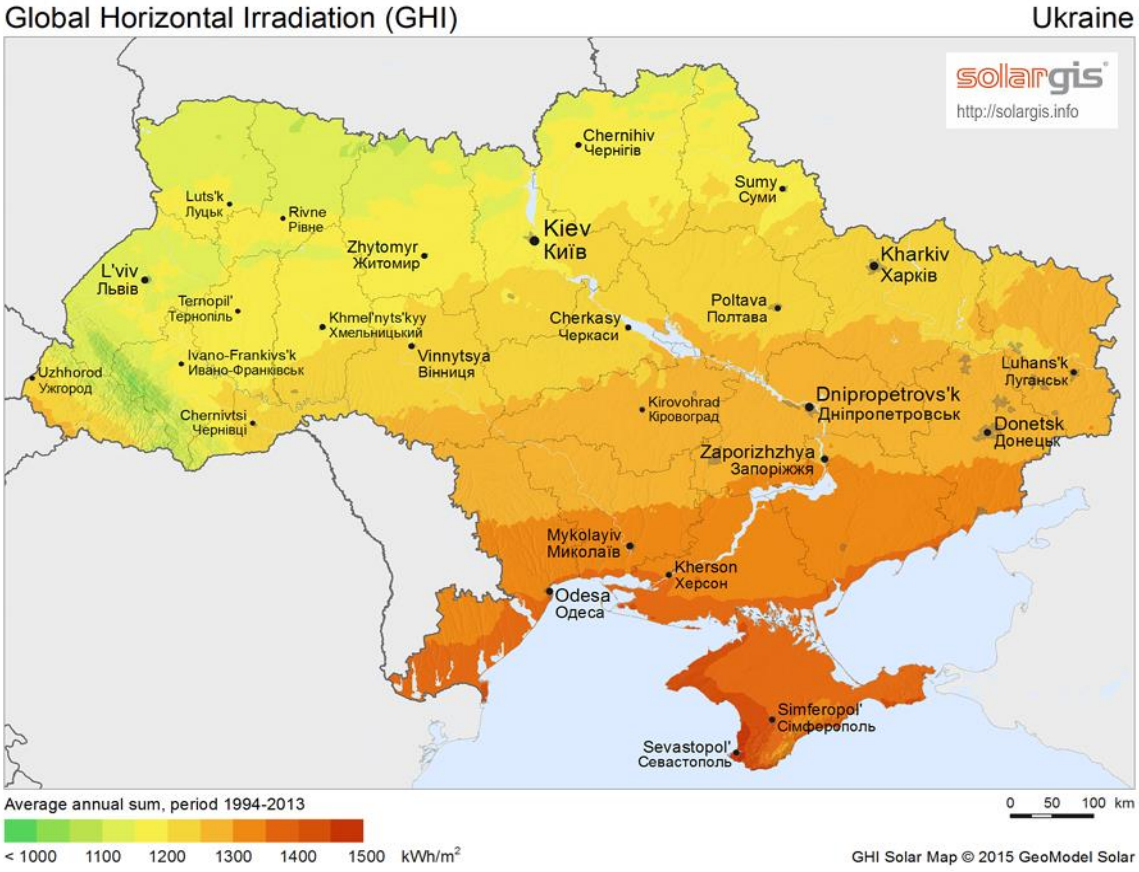
Today, Ukraine has certain developments on the technological processes for almost all types of generation or extraction of non-traditional fuels and energy, and the country's industry is capable of arranging production of necessary equipment and machinery within a short period. The volumes of annual accumulation of industrial waste in Ukraine per area unit are almost a sequence higher than the levels of developed countries. Each thousand kilowatt-hour of electricity generated from those

wastes would, on the average, prevent emission of 4.2 kg of solid particles, 5.65 kg of sulfur oxides and 1.76 kg of nitrogen oxides into the atmosphere, and each generated gigacalorie of heat – emission of 0.2 kg of solid particles, more than 3 kg of sulfur oxides and about 1 kg of nitrogen oxides.

In addition to the improvement of the environment, it should be noted that development of RES use will also contribute to the creation of new jobs and support of domestic production.

Development of the sector of alternative energy sources envisages re-profiling of many research and design institutions, as well as industrial enterprises, for development and manufacturing of equipment for alternative energy. This equipment will be used for creation of the facilities generating alternative energy in the country and, to a significant extent, exported.

For the use of the sun to generate heat, solar collectors are used that allow heating water up to 50-60 degrees. In addition, the use of photovoltaic solar batteries allows receiving electric energy directly. The average annual volume of solar radiation gained by 1 m2 in Odessa area exceeds 1,100 kW*hour/sq.m. The solar energy potential in Odessa is sufficiently high for the broad use of both solar and photovoltaic equipment. The period of efficient use of solar energy equipment in Odessa is 8 months (March through October), and photovoltaic equipment may be utilized rather efficiently throughout the entire year.

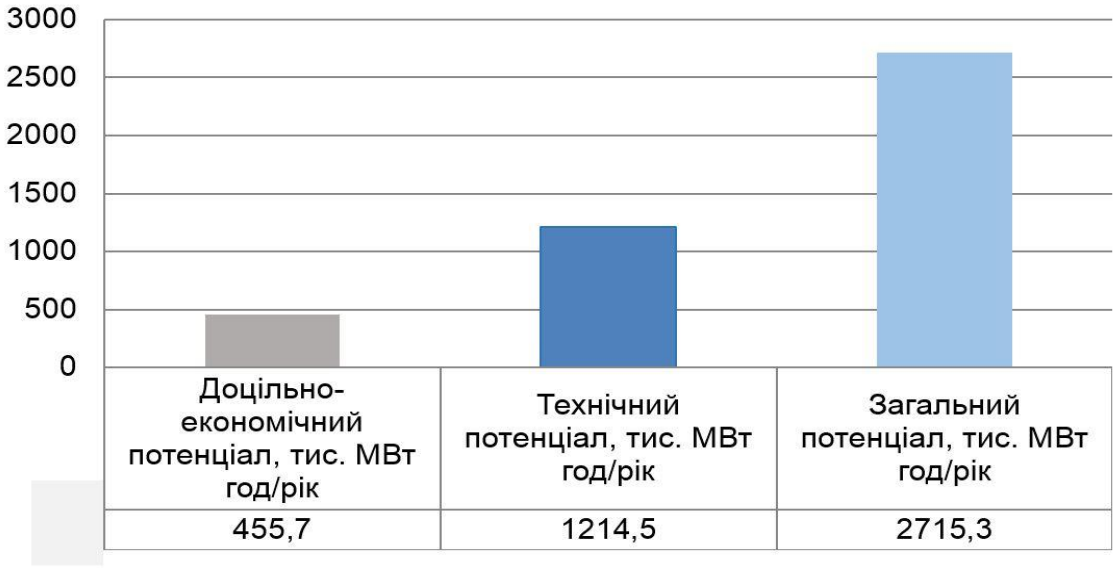


Graph 2. Solar energy potential in the territory of Ukraine.[4]

Considering the climate and meteorological conditions of Odessa, it would be efficient to use both flat solar collectors utilizing both direct and diffused solar radiation, as well as concentrated solar collectors.

The comparison diagram in Graph 3 proves that Odessa occupies one of the leading positions in Ukraine by the solar energy potential and is only outpaced by the Autonomous Republic of Crimea.

The main sources of the low-potential waste heat of technogeneous origin are ventilation wastes and cooling water from technological and energy equipment of the plants, as well as industrial and household waste water. Experiences of the leading countries prove that it would be most efficient to use the heat from waste water using heat pumps. Graph 3 contains information on availability of such potential in Odessa.



Required economic potential, thousand MW*hour/year	Technical potential, thousand MW*hour/year	Total potential, thousand MW*hour/year

Graph 3. Energy potential of the low-potential thermal energy of waste waters in Odessa

3. Odessa background information

3.1. Historic information

Odessa was founded on 2 September 1794 in the area of the settlements that have been used since the ancient times as anchorages and ports. The city development was based on the project by engineer Colonel Francois de Wollant. Soon after its foundation, Odessa becomes the main supplier of grain to the countries of Europe and Asia.

In 1805, Odessa received the status of the administrative center headed by the mayor of Odessa, Duke Armand Emmanuel de Richelieu. Efficient management of the city, booming sea trade, benefits from the Government – all this contributed to Odessa's rapid development. Already in the middle of the 19th Century, the city becomes an economic and cultural center at the North Black Sea coast. In 1828, the monument to Armand Emmanuel de Richelieu was erected in Odessa (Graph 4).

A historic specific of Odessa is its ethnic diversity. Formation of Odessa as a multi-national city was reflected in its planning and formed a special unique cultural atmosphere.

From the first decades of its existence, Odessa has set the standards for domestic science and culture. The city's specific feature is its unique architecture.

Graph 4. Monument to Duke de Richelieu (sculptor: I. Martos), Mykolaivsky Boulevard, Odessa. Published: end of the 19th Century. Colored lithography. Author: S.V. Kulzhenko

In the second half of the 20th Century, new residential areas and neighborhoods were formed: Odessa agglomeration was set with the formation of a powerful port and industry complex of Odessa-Illichivsk-Pivdenny.

Graph 5. View of the Odessa port.

Since 1991, the city has been developing in the independent Ukraine and is its sea gate (Graph 5)

3.2. Description of the City

Odessa is one of the largest cities in Ukraine with the population over one million, the administrative center of Odessa Oblast.
Population: 1,012,100.

Odessa is located at the North-West coast of the Black Sea at the crossing of ways from the North and Central Europe to the Middle East and Asia.

The City is crossed by three international transport corridors:

1. Pan-European No. 9 that connects Finland, Russia, Lithuania, Belarus, Ukraine, Moldova, Rumania, Bulgaria and Greece.
2. Gdansk – Odessa (Baltic Sea – Black Sea). Participant countries: Italy, Slovenia, Hungary, Slovakia, Ukraine.
3. Europe – Caucasus – Asia (TRACECA). Participant countries: Ukraine, Moldova, Bulgaria, Rumania, Turkey, Georgia, Armenia, Azerbaijan, Turkmenistan, Uzbekistan, Kazakhstan, Kyrgyzstan and Tajikistan.

The City's population is 1,012,100.
The number of population engaged in all areas of economic activities is about 390 thousand. The main economic area is industry, which represents the unified fully

developed local territorial and production hub of the Ukrainian Black Sea coast. Odessa industrial enterprises account for 1.3% of Ukraine's sales of industrial products.

The City is located within the Dniester-Bug lowlands of the Black Sea coast section of the Steppe Landscape Zone. The City's territory is a semicircle that embraces the Odessa Gulf of the Black Sea from the South-West and the North.

The City's territory in the East and South-East is washed by the sea. In the South-West, the City borders on Sukhy Estuary and in the North-East - on Khadjibey and Kuyalnyk Estuaries.

The length of the sea coast within the City is 30 km.
The highest point is the Shkodova Hill of 70 m above sea level and the lowest is Peresyp, which is an isthmus between Khadjibey and Kuyalnyk Estuaries. The part of Peresyp, which is adjacent to the estuary, is 5 m below sea level.

The relief of the City territory is a coastal plateau with an insignificant inclination (to 4%) towards the sea. The City has access to the sea in its Eastern and South-Eastern parts with the coast with stepped slopes and sandy spits. The coastline has very diverse geological and geomorphological characteristics: sand spits, natural sand beaches, protective dams. Spits and bay bars are 1.0 – 3.5 m above the sea level.

The geological structure of the coast is as follows: Neogene sands, limestone, siltstone, sandstone, and marlstone. The bedding rocks are overlaid with anthropogenic red-brown clays and loess formations (clay loam, sandy/clay/marlstone rock, sand). The latter are used for manufacturing of bricks, cement and pottery. Red and brown clays serve as the main water-retaining layer.

The City's climate is moderate continental with a short winter with little snow and a long hot summer. The average annual temperature is +9.8 °C, absolute temperature minimum: -28.0 °C, absolute maximum: +37.0 °C. The heating season lasts for 165 days. The average annual precipitation level is 374 mm.

The City's area belongs to the category of increased complexity of the construction engineering, which is primarily connected with the City's location on the limestone deposits. The City stands over Odessa Catacombs that are world famous not only due to their complex labyrinths but also the length that reaches three thousand kilometers. According to the seismic scale Odessa belongs to the danger zone of 7 points.

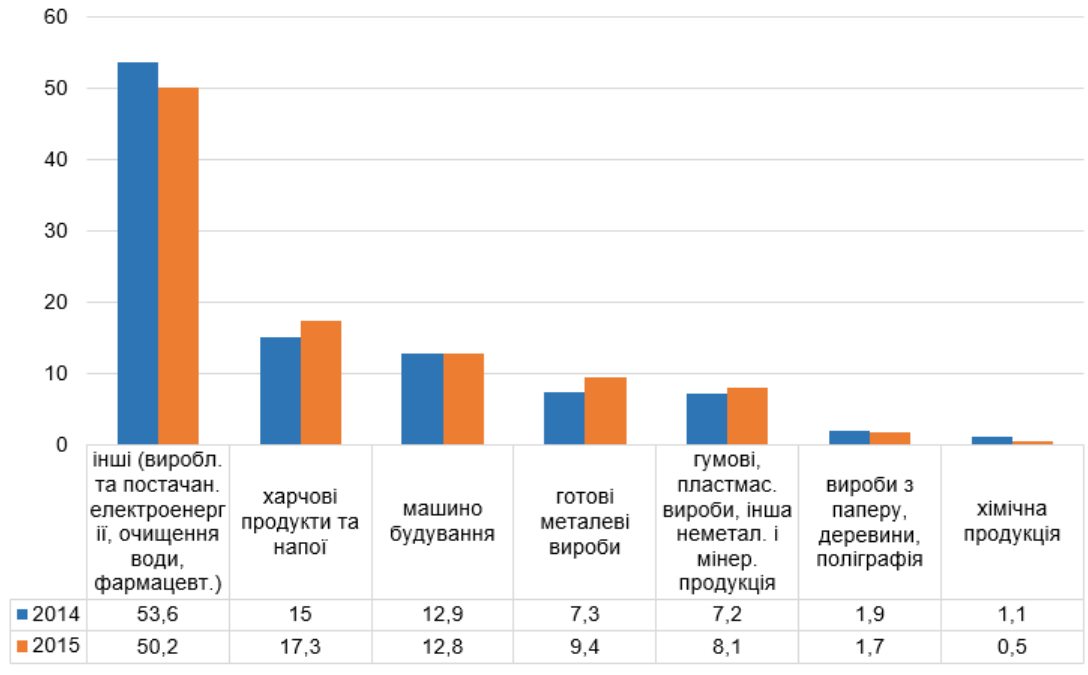
By the hydro-geological conditions, the City's territory belongs to the Black Sea Artesian Basin with unfavorable conditions of subsoil water accumulation. The main water supply source in Odessa is the river Dniester. Alternative water supply sources:

the Danube, the Southern Buh, the Dnieper, as well as subsoil waters in the volume of 63,800 cubic meters per day. In the City, there are 16 well-rooms that provide citizens with artesian water (total flow rate: 1,800 cubic meters per day).

In January - June 2015, the City's industrial enterprises sold their products in total for UAH 7,733.0 million (36.7% of the total sales of industrial products in the Oblast), in January - June 2014, – for UAH 5,740.5 million (40.9% of the Oblast total).

Growth of the share of sales (Graph 6) is observed in: production of food, drinks and tobacco products (+2.6%), metallurgy products (+2.2%), rubber and plastic goods, other non-metal mineral products (+1.0%), machine building (+0.2%).

The largest sales were by the companies producing foodstuffs and drinks (17.3% of the total volume), machine building (12.8%), metallurgy products (9.4%), rubber and plastic, other non-metal mineral products (8.1%).



	інші (виробл. та постачан. електроенергії, очищення води, фармацевт.)	харчові продукти та напої	машино будування	готові металеві вироби	гумові, пластмас. вироби, інша неметал. і мінер. продукція	вироби з паперу, деревини, поліграфія	хімічна продукція
2014	53,6	15	12,9	7,3	7,2	1,9	1,1
2015	50,2	17,3	12,8	9,4	8,1	1,7	0,5

other (generation and supply of electricity, water treatment, pharmaceuticals)	foodstuffs and drinks	machine building	finished metal products	rubber, plastic and other non-metal mineral products	paper, wood, printed products	chemical products

Graph 6. Structure of sales of industrial products (by the types of industry) in January - June 2014 and in 2015.

As of 1 July 2015, total foreign direct investments (equity capital) from other countries of the world into the City's economy without taking into consideration the debt instruments amounted to USD 571,300,000. In comparison with the beginning

of 2015, the reduction is USD 34,400,000 or 5.7% including the foreign exchange difference of USD 25,300,000. The volume of foreign direct investment (equity capital) per capita in January - June 2015 was USD 571,800,000.

During January - June 2015, the City's companies and organizations made capital investments from all funding sources of UAH 1,672.3 million, which is 58.9% of the Oblast total.

The volume of cargo processing by Odessa International Sea Trading Port (OISTP) in January - July 2015 was 14,100,000 tons and grew by 723,100 tons (+5.4%). Internal communications grew by factor of 2.4 in comparison with January - July 2014.

OISTP cargo processing volumes

Table 1

Odessa ISTP	January - July 2014, thousand tons	January - July 2015, thousand tons	Dynamics, 2014-2015, %
Total	13 384,0	14 149,0	+5,4
Export	8 174,71	9 837,2	+16,9
Import	1 781,3	1 373,4	-29,7
Transit	3 053,2	2 894,0	-5,5

The volume of cargo transportation grew by 17.4% (to 18,700,000 tons) due to the increase of cargo transportation by railroad by 13.4% and motor transport by factor of 1.9.

Passenger transportation in Odessa fell by 10.6% (149,000,000 passengers used the passenger transportation services) because of the reduction of passenger transportation by motor transport by 17.0%.

3.3. Description of key suppliers and consumers of energy

3.3.1. Gas supply

Gas is supplied by Odessagaz PJSC. The total volume of the natural gas supply infrastructure in the City reaches 92%. Three gas distribution stations supply the high, medium and low pressure gas to the consumers

The company employs 2,875 workers. The total length of gas pipelines is 12,056.623 km including 419 gas distribution points, 1,865 cabinet-type units and 913 cathode protection stations. Household gas is supplied to 827,617 apartments, of which

natural gas is supplied to 586,694 apartments. The number of gas meters installed and operated is 387,021.

At some gas regulation units, telemetry systems are installed, which allows remote control of the gas distribution parameters.

3.3.2. Electricity supply

In Odessa, electricity is supplied by the separated entity of Odessaoblenergo PJSC. The Company is a natural monopolist in the City of Odessa and Odessa Oblast. Its competitors are independent electricity suppliers and Odessa Railroads as a licensee under the regulated tariff.

The key consumers of electricity are: Odessa Port Plant, Infox LLC, Odessa Oil Refinery PJSC, CE "Teplopostachannia mista Odesy" (Odessa City Heating Company), CE "Odessamiskelectrotrans" (Odessa City Electric Transport Company), Odessa TPP PJSC.

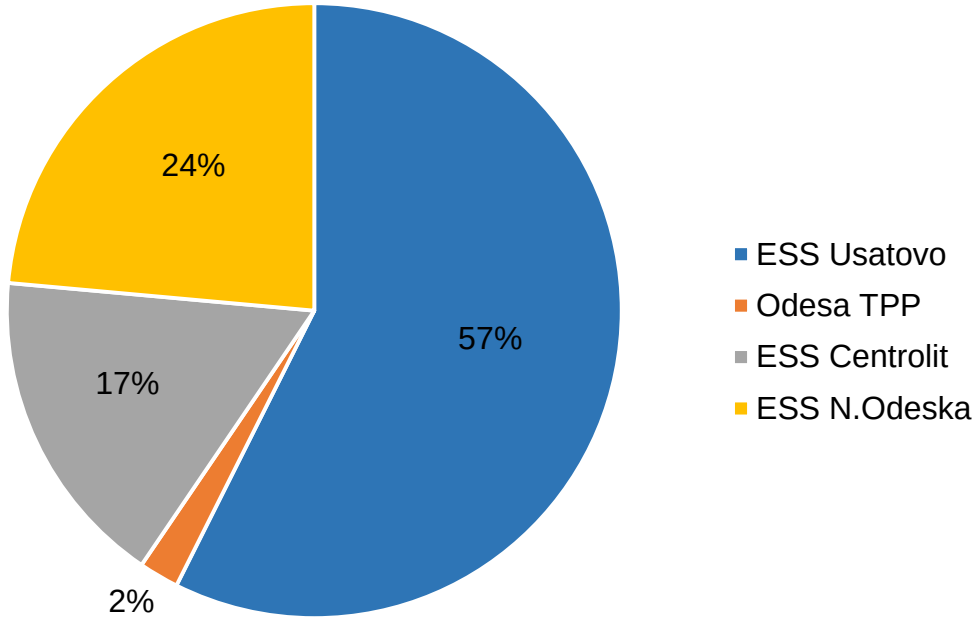
The Company's situation, particularly, its financial condition, is influenced by the paying capacity of industrial and household electricity consumers, the age of equipment and weather conditions.

The system of electricity supply is deemed to be one of the most complex and resource-intensive and, therefore, requires special attention. It consists of the following major systems:

- system of general electricity supply;
- system of uninterrupted electricity supply;
- system of guaranteed electricity supply;
- feeder main, distribution and group grids;
- earthing system.

The main electricity supply sources in Odessa are: Electric Substation Usatovo, Electric Substation N. Odeska, Electric Substation Centrolit, Odessa TPP. The distribution of load by the hub substations and TPP may be seen in Graph 7.

Table 2 contains general characteristics of Odessaoblenergo PJSC



Graph 7. Electricity supply sources in Odessa.

General characteristics of Odessaoblenergo PJSC

Table 2

Parameter	Measuring unit	Quantity in 2012
Number of customers, total	**unit**	**996,123**
1 Class of voltage	**unit**	271
2 Class of voltage	**unit**	995,852
population	**unit**	950,129
Total length of electricity networks	**km**	**43,185**
overhead:	km	39,822
110/150 kW	km	2,395
35 kW	km	3,912
6/10 kW- 20 kW	km	14,064
0.38 kW	km	19,451
cable:	km	3,363
110 kW	km	4
35 kW	km	33
1-10 kW	km	2,096
0.38 kW	km	1,230

Total capacity of the Company's transformers	MW	6,234
110 kW	MW	2,977
35 kW	MW	934
6/10 kW - 20 kW	MW	2,323
Total number of substations	unit	8,864
110 kW	unit	69
35 kW	unit	204
6/10 kW - 20 kW	unit	8,591
Average number of workers	persons	6,000
Average monthly wage	UAH	3,965

3.3.3. Heating supply

The district heating system in Odessa covers approximately 95% of consumers. The leading company engaged in generation, transportation and supply of thermal energy is the Communal Enterprise "Teplopostachannia mista Odesy".

Heating in the City is supplied by Odessa TPP PJSC and CE "Teplopostachannia mista Odesy". The number of boiler stations under full business control of CE "Teplopostachannia mista Odesy" is 141 including 7 district stations, 6 neighborhood stations, 128 group and individual stations (132 on gas and 9 - on coal). Four boiler stations are in the process of technical servicing. The installed heating capacity of the boiler stations on technical servicing is 2.4 GCal/hour. The connected heating capacity of the boiler stations on technical servicing is 0.8 GCal/hour. The community and CE "Teplopostachannia mista Odesy" have under their full economic jurisdiction 796.7 km of heating two-pipe networks (161.4 km of trunk networks, 458.4 km of heating networks and 176.9 km of hot water supply networks), and 224 central heating units. In total, the company has 408 boilers. Total heating rating of the boiler stations: 1,784.4 GCal/hour. Because of disconnection of consumers from district heating and installation of individual heating, four boiler stations have been put on standby. Out of the total length of heating networks, 238.4 km of two-pipe networks ensure transportation of the heat transfer agent from Odessa TPP to the consumers in the central part of the City.

About 90% of the heat generated is used for heating and hot water supply and the rest is used by public and other organizations.

The number of residential buildings is 3,968 with the heated area to 12,500,000 sq. m. Hot water supply services are provided to more than 467,000 people.

Heating is supplied to budget-funded organizations: 151 schools, 108 kindergartens, 148 medical institutions and 102 culture institutions.

Specific consumption of conventional fuel is 160.9 kgoe / GCal.
In order to perform these functions, the company employs to 3,000 workers depending on the season. Within the company's structure, there are: 6 operation and repair districts, 4 workshops and 3 services.

All electricity generated at the TPP (except that for TPP's own needs) is supplied to the wholesale electricity market of SE Energorynok

3.3.4. Water supply and sewerage

Odessa's water supply system provides drinkable water to the population and companies of: Odessa, Illichivsk, Bilyaivka, Pivdennyi and 45 populated places in Bilyaivka, Ovidiopol and Kominternivske raions within 50 km away of the Oblast center. Within this area, more than 50% of the Oblast population reside and almost 80% of the Oblast's industrial and transport potential is concentrated.

The surface water supply source is the Dniester river that flows through the territories of Lviv, Ivano-Frankivsk, Ternopil, Chernivtsi and Vinnytsia Oblasts of Ukraine and the Republic of Moldova. A branch of the utility company Infoxvodocanal treats water from the Dniester and transports it for 40 km. The surface water is treated at the unified integrated Water Treatment Complex "Dniester" with the water intake near the town of Bilyaivka. The facility had several rounds of modernization and extension and is currently divided conventionally into two adjacent platforms - the "new" and the "old".

The "Dniester" WTC consists of:

- water intake facilities (feeding channels, first-stage pumping stations);
- water silting facilities (horizontal silting tanks) of the "new" platform and the silting channel of the "old" platform;
- treatment facilities (including the high-rate filter blocks and the chemical section);
- disinfection facilities (chlorination plants and storages for chlorine containers);
- clean water reservoirs and second-stage pumping stations with the system of water pipelines and an elevating pumping station for supply of water to the consumers.

Today's capacity of the "Dniester" Water Treatment Facility is 820,000 m3 / day.

Upon treatment, water is supplied through the system of main branch lines to consecutive consumers and to the municipal water pumping stations.

The actual water supply by "Dniester" WTC's pumping stations is 350-400 m3 / day.

The system of main branch lines consists of 7 lines and the Karolino-Buhaz water duct. Through the system of main branch lines, water comes into the City and further, through the system of gravity conduits to the municipal pumping stations. Water is pumped onto the municipal water network by seven main zonal pumping stations: Holovna Station, Pivdenna Station, Kotovskoho Station, Zakhidna Station, Stolbova Station, Shkodohorka Station and Zhevakhova Hora Station.

In addition to the seven pumping stations, there are also 54 low-capacity booster stations that provide water for individual neighborhoods or groups of buildings, as well as pumping stations that deliver water to the neighboring populated areas. The total length of water conduits and water networks is 1,661.112 km.

The sewerage system is an aggregate of networks and facilities designed for organized collection of waste water resulting from the population's activities, operation of enterprises and atmospheric precipitation, as well as transportation and treatment before discharge into water reservoirs.

Odessa's sewerage system is divided into two sewage catch basins - the Northern and the Southern.

The Northern Basin is a combined sewage system (joint collection of the rain and household waste water).

The Southern Basin is a separated system for sewerage of rain water and household waste water.

The sewerage system consists of the street sewers, submain sewers and yard sewers that transport waste water by gravity from the consumers to 27 sewerage pump stations. After that, the waste water is pumped through pressure pipelines to the corresponding biological treatment stations (BTSs) - the Northern BTS or the Southern BTS. The total length of sewerage networks is 689,319 km. The most common pipe diameters are 300 to 1200 mm.

The facilities collecting waste water from Odessa residents and transporting it to the treatment stations (the Northern BTS and the Southern BTS) are operated by the Infox LLC.

3.3.5. Residential stock

Odessa's residential stock consists of 21,396 buildings of the total area of 18,200,000 sq. m, of which 54% were constructed at the end of the 19th – beginning of the 20th Century, and other 30% were built in 1960s – 1970s.

Within the structure of the residential stock, multi-family buildings dominate with the share of 87% of the total housing stock. The share of single-family houses is 13% in the total housing stock. By the number of stories, the breakdown of the residential stock is as follows: high-rise - 43.5%, mid-rise - 26.5%, low-rise and single-storied - 30%.

The City's residential stock is highly depreciated. About 27% of the residential stock have the wear factor of 60% or higher.

As of 01.01.2015, there are 4,924 lifts in the City's residential buildings, particularly:

- in municipally owned buildings – 2,804 lifts;
- in buildings of residential construction cooperatives (RCC) – 740 lifts;
- in buildings of Associations of Co-Owners of Multifamily Buildings (ACMB) – 1145 lifts;
- in industry-sponsored residential buildings – 235 lifts.

As of 01.01.2015, 402 ACMBs were registered in Odessa. In 2014, sixteen new ACMBs were registered.

3.3.6. Social and Cultural Institutions

The system of Odessa's preschool education covers 158 preschool institutions designed to host 26,800 users. The level of preschool enrollment is 58%. The load of preschool institutions keeps growing and in 2015 there were 158 children for 100 places.

In the City, there are 169 general education institutions where 86,284 pupils study. There are 31 higher education institutions of the Accreditation Levels 1-4.

The City has 35 hospital establishments with the total number of beds of 9,830. The ratio of hospital beds to population is 99.2 per 10,000 residents. There are 79 outpatient polyclinic institutions designated to service 21,618 visitors per shift. Per 10,000 residents, 218 people can be serviced per shift.

The City has 53 libraries with 8,297,900 books in total. The book/population ratio is 823 per 100 people.

In Odessa, there are 10 theatres, a philharmonic society, 26 museums, 9 cinemas and 8 artistic unions that contribute to the cultural and spiritual education of the City's population. The leading role in the City's cultural life is played by Odessa National Academic Opera and Ballet Theatre. It was built in 1884-1887 and is a unique architectural monument.

3.3.7. Transport structure

The population's transportation needs are satisfied by the network of routes of the total length of 3,457.4 kilometers. It is serviced by more than 20,000 vehicles including more than 300 electric transportation means. However, the problems of the electric fleet renovation are extremely difficult to solve as its physical wear is 85 percent.

The total density of bus routes is 6.332 km2, which is the highest in Ukraine and corresponds to European levels. The City's route networks consists of 117 routes including 20 for trams, 11 for trolley-buses and 86 for buses.

On 67 routes, 1,260 buses are operated in the fixed-route taxi mode. In particular, the city's carriers purchased more than 1,000 small, medium and large buses. Buses of the models: GAZ-32213, Acia-Tonic AM 725, Toyota-Hiace, Ikarus, LiAZ, LAZ, PAZ-3205, RAF, Toyota, Ford and others have been almost totally taken out of operation. The renewed buses are not only more comfortable and safe, but also comply with the environmental requirements - Euro-1, Euro-2 and Euro-3.

Per day, the City's public transport services over 695,000 passengers including 217,000 privileged passengers who are transported for free. As an additional obligation, the transportation company Europa VVV LLC launched the InvaTaxi Program in 2004. The Program provides transportation services with specialized vehicles for the persons with musculoskeletal disorders and invalids on wheel carts.

It should be noted that the length of Odessa's territory from the North to the South is 35 km. However, the transport routes that connect the City's most important bedroom suburbs (Kotovskoho and Tairova districts), pass through the central part. Many roads need capital renovation. All this has a negative impact on the traffic speed and safety in the City.

3.3.8. Street lighting network of the Odessamisksvitlo Municipal Company

The total length of the street lighting networks is 1,030.9 km, of which: the surface line – 476.8 km, the cable line – 554.1 km. The length of the network for remote control of street lighting is 65 km. The system has 300 control units. The inventory number of

lamps installed in the City's streets: 35,390, of which incandescent lamps: 8,285, sodium-vapour lamps: 22,776, mercury-vapour lamps: 4,329. Total capacity of the lamps: 5,906 kW. The street lighting networks are maintained by Municipal Company "Odessamisksvitlo".

3.3.9. Services sector

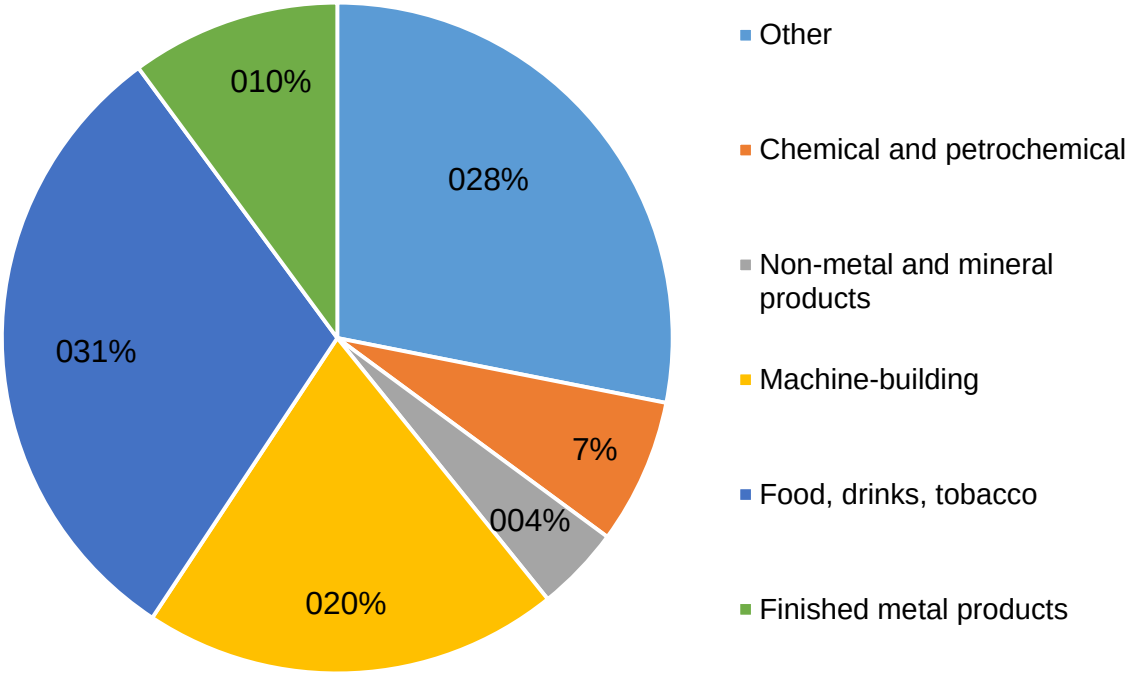
During 2015, Odessa's hotel room stock was actively expanded, which made the City one of today's leaders in terms of temporary accommodation facilities. The City's hotel capacity keeps increasing. In 2015, the following hotels were opened: "M1 club hotel" 4* – 68 rooms, "Kadorr Hotel Resort & Spa 5* – 25 rooms, as well as many mini-hotels and hostels (such as "Vintage Hotel Odessa", "Greek Hotel and Hostel", etc.) Based on the results of the 2015 summer season, approximately 1,800,000 tourists chose Odessa as a recreation destination (in 2014, there were 800,000 tourists). Positive trends remain in 2016, as well. The City has many restaurants. As of 2015, Odessa had 692 catering business entities: restaurants, cafes, bars, etc. The best known are: Fanconi 1872, Pecheskaho and others. Also, there are such catering networks as McDonald's, Puzata Khata, Celentano Pizza, etc.

The City has well-developed retail trade infrastructure. The retail network consists of 14,670 entities. There also some European and many domestic supermarket chains, of which very popular are: "Auchan", "METRO", "Silpo", "Tavria-B", "Fourchet". The most famous City's marketplaces are "Pryvoz" and "Novyi Rynok".

The social infrastructure is well developed in the City: 10 theatres, 9 cinemas, 30 museums. Residents may use about 1,500 sport facilities: tennis courts, football fields, gyms, swimming pools, shooting galleries, etc. In Odessa, there are 168 fuel filling stations. Both Ukrainian and foreign banks have about 655 branches and 858 ATMs in the City.

3.3.10. Industry

Odessa is an integral fully developed local territorial manufacturing complex and an industry hub of the Ukrainian Black Sea coast. The structure of the City's industry as of 2011 is presented in Graph 8.



Graph 8. Structure of industrial production by economic activity areas in Odessa, 2011.

As can be seen from Graph 8, the largest share in the structure of the City's industrial production belongs to food companies (30.6%) that produce meat and fish products, flour, cereals, bakery products, alcoholic and non-alcoholic drinks and juices. The share of machine-building companies is 20.1%. They produce pumps and lifts for liquids, ploughs, machinery and equipment for food industry, low-voltage electric equipment, electric wires and cables, telephone and telegraph communication equipment, medical equipment and instruments, automobile trailers and semi-trailers, etc. Metallurgy and manufacturing of finished metal products are represented by the companies producing pre-engineered building systems, door and window sets, preserve cans out of ferrous metals, etc. The enterprises of the chemical and petrochemical sectors that take 7.0% of the sales of industrial products manufacture paints and varnishes on the polymeric basis and such household goods as washing and cleaning agents, pharmaceuticals

Manufacturing of other non-metal mineral products is represented by the companies that produce cement, as well as cement blocks and bricks, artificial stones, concrete, tiles, quadrels, elements for pre-engineered building systems and concrete mixes.

The City has a well-developed pulp and paper sector, as well as the printing sector (printing of newspapers, journals and periodicals, labels and tags from carton); production of furniture, wood processing (windows, doors, frames and thresholds); light industry (outerwear, men's suits and women's costumes, trousers, skirts, shirts, knitwear, footwear).

4. Structure and development of energy consumption

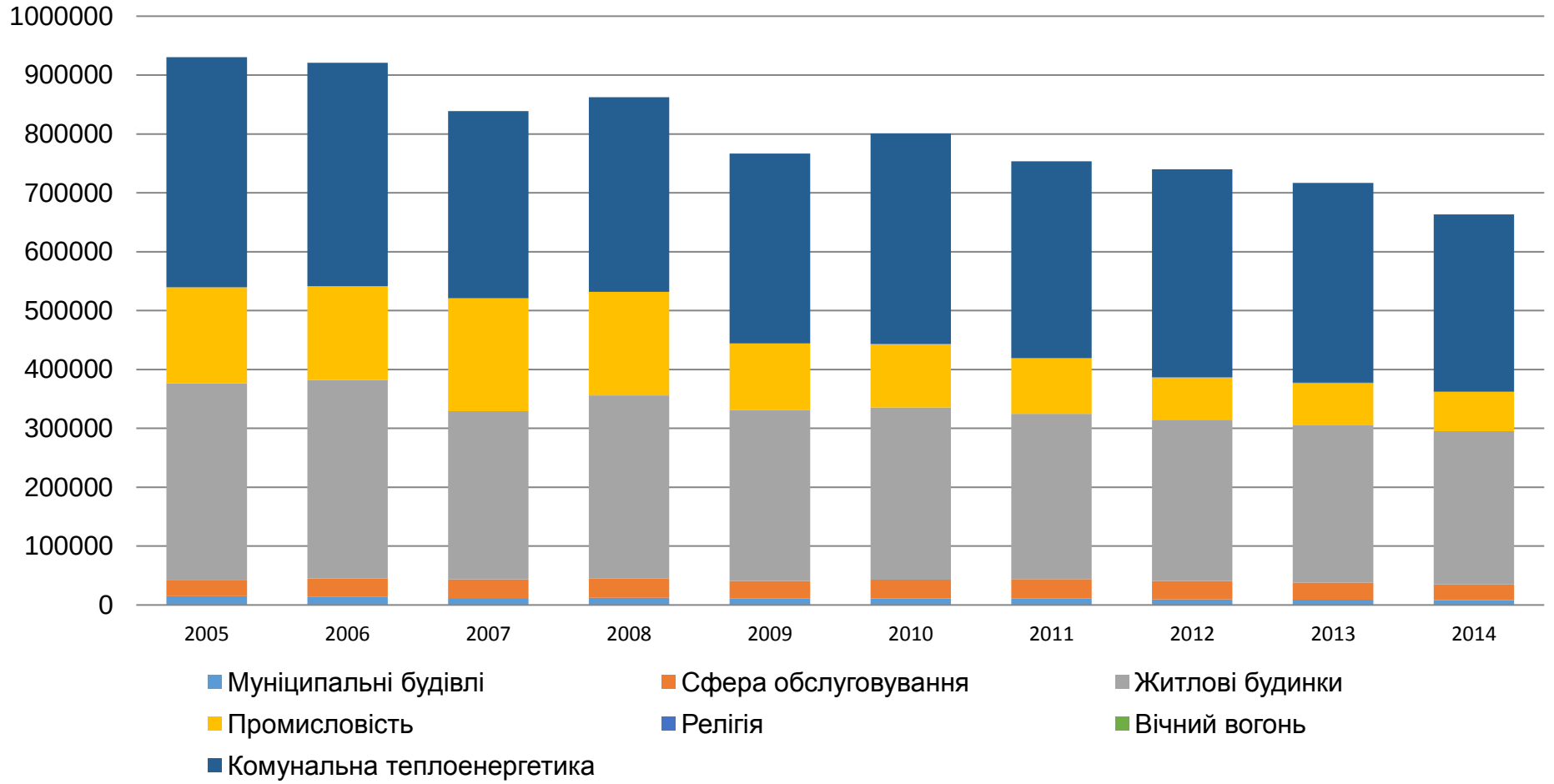
For the estimation of the volumes of consumption of energy resources, the consumption structure, the largest end users and losses in distribution networks, information was collected on consumption of all types of energy resources in Odessa by the end users and generation/supply of energy by the supplying companies during 2005 through 2014. The data source was information received from the City Statistics Department, internal documentation, inquiries to relevant consumers and suppliers. Information is presented in tables and graphics.

4.1. Structure of consumption of the natural gas

Structure of consumption of the natural gas (thousand m3)

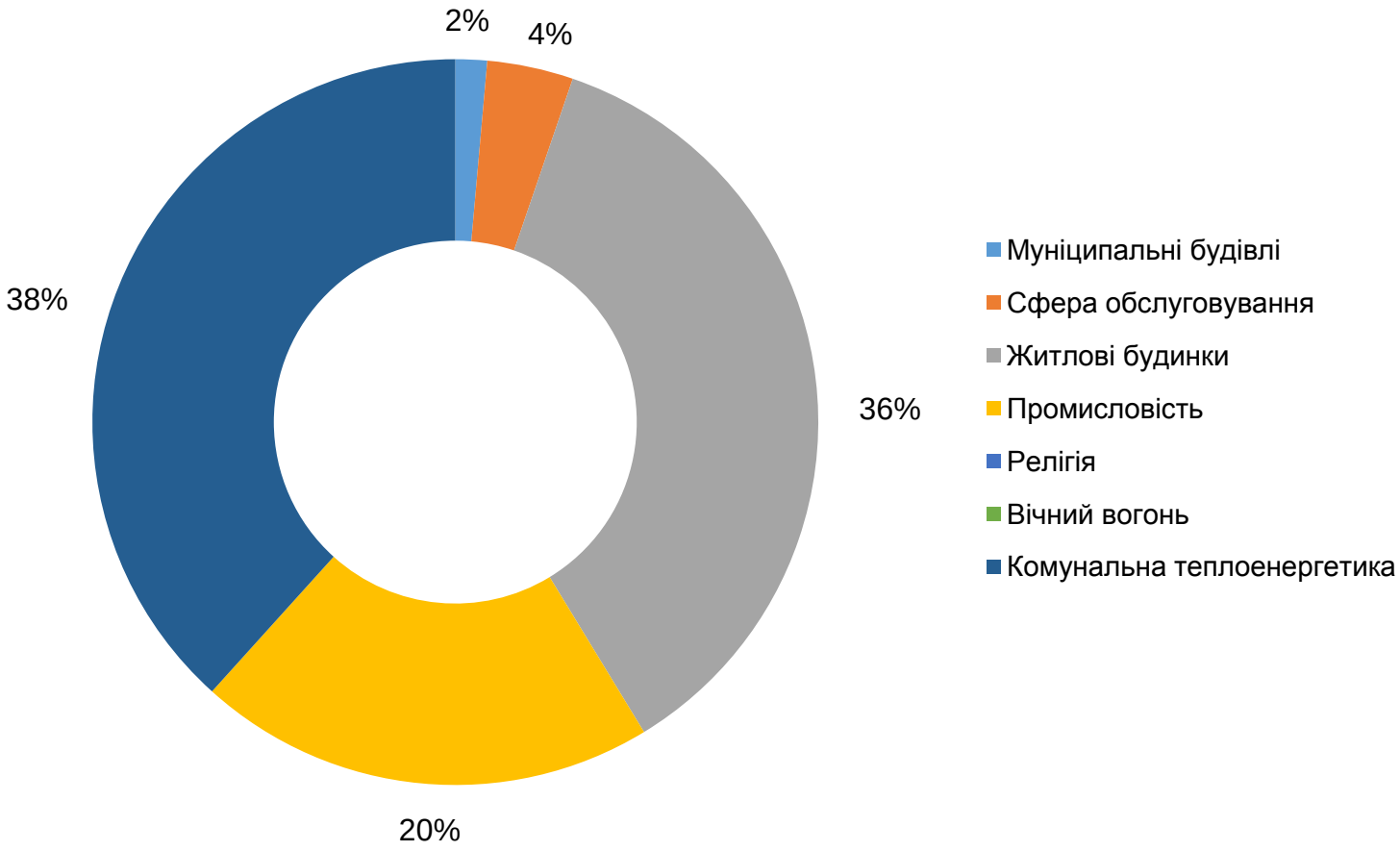
Table 3

Sector		Municipal buildings	Services	Residential buildings	Industry	Religious entities	Eternal fire monuments	Municipal heating	Total
Year	2005	14 838,506	26 883,366	334 786,138	163 231,77	0	0	390 715,023	930 454,803
	2006	13 692,596	31 295,873	336 997,024	159 433,333	0	0	379 270,516	920 689,342
	2007	11 970,2	31 571,531	285 796,375	191 577,279	0	0	317 681,63	838 597,015
	2008	12 138,157	33 105,095	310 758,765	175 877,958	0	0	330 252,58	862 132,555
	2009	11 013,879	29 664,74	290 532,553	112 753,281	147,24	0	322 359,194	766 470,887
	2010	11 304,023	31 708,052	292 509,906	107 466,245	642,106	5,76	357 017,531	800 653,623
	2011	10 710,916	33 308,27	280 671,525	94 280,959	766,798	13,824	333 925,762	753 678,054
	2012	9 659,843	31 247,39	273 821,41	71 457,172	774,718	13,824	353 117,36	740 091,72
	2013	9 098,912	28 911,155	268 209,56	70 566,475	729,189	13,824	339 253,528	716 782,643
	2014	8 138,375	26 782,531	260 225,324	66 738,905	690,91	13,824	300 721,797	663 311,666



Municipal buildings Industry Municipal heating	Services Religious entities	Residential buildings Eternal fire monuments

Graph 9. Structure of consumption of the natural gas (thousand m3).



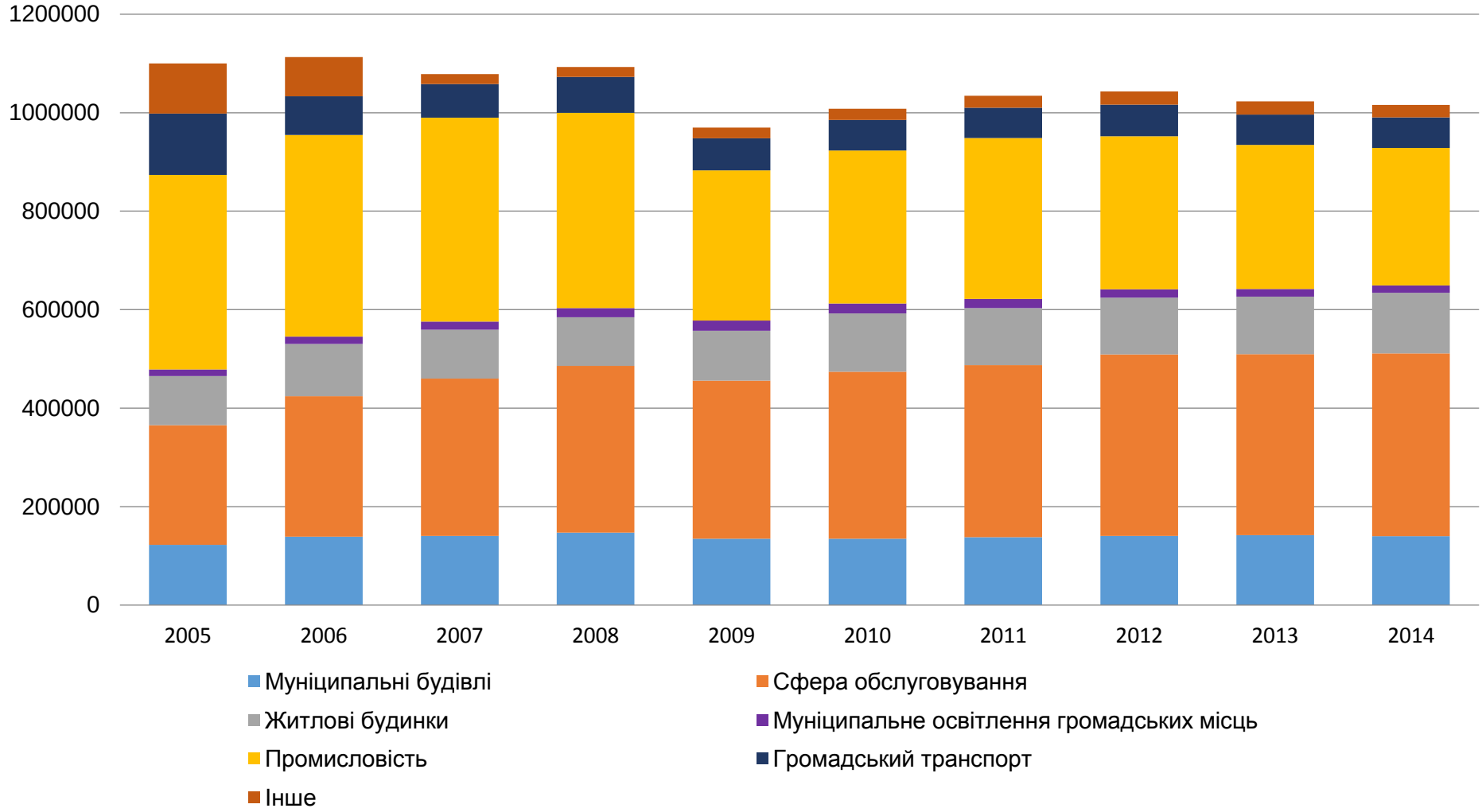
Graph 10. Breakdown of natural gas consumption in 2008, %

4.2. Structure of electricity consumption

Consumption of electricity in Odessa, MW

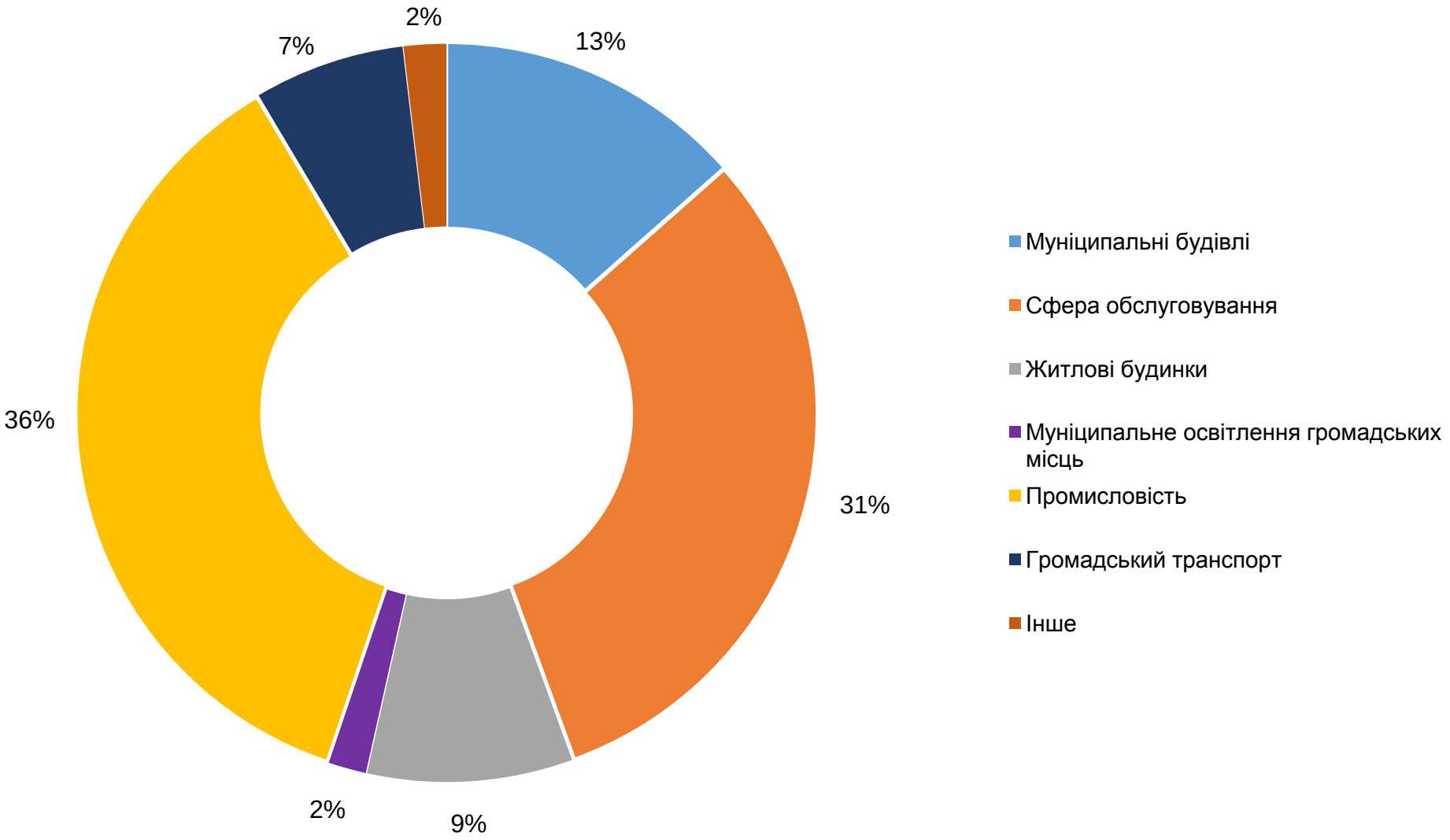
Table 4

Sector		Municipal buildings	Services	Residential buildings	Municipal street lighting	Industry	Public transport	Other	Total
Year	**2005**	122 458,10	242 847,50	100 053,00	13 188,00	395 322,10	124 487,30	101 675,10	1 100 031,10
	2006	138 727,40	285 684,40	106 140,00	15 019,30	409 260,30	78 661,00	79 350,40	1 112 842,80
	2007	140 713,60	319 151,60	99 333,40	16 664,50	414 159,80	68 039,50	20 295,00	1 078 357,40
	2008	147 326,10	338 360,90	99 186,80	18 277,40	396 506,10	72 840,20	20 545,70	1 093 043,20
	2009	134 957,50	320 803,40	101 308,80	20 809,20	304 993,80	65 029,00	21 637,20	969 538,90
	2010	134 822,80	339 371,10	118 155,80	20 097,10	310 877,90	62 016,30	22 882,60	1 008 223,60
	2011	137 756,70	349 411,20	115 819,90	18 910,80	326 437,50	61 700,60	24 319,50	1 034 356,20
	2012	140 449,90	368 698,00	115 142,60	17 222,60	310 826,70	63 854,70	26 974,40	1 043 168,90
	2013	141 943,80	367 788,50	116 666,00	15 396,00	292 756,00	61 717,60	26 726,30	1 022 994,20
	2014	122 458,10	242 847,50	100 053,00	13 188,00	395 322,10	124 487,30	101 675,10	1 100 031,10



Municipal buildings Residential buildings Industry Other	Services Municipal street lighting Public transport

Graph 11. Electricity consumption in Odessa, MW



Municipal buildings
Services
Residential buildings
Municipal street lighting
Industry
Public transport
Other

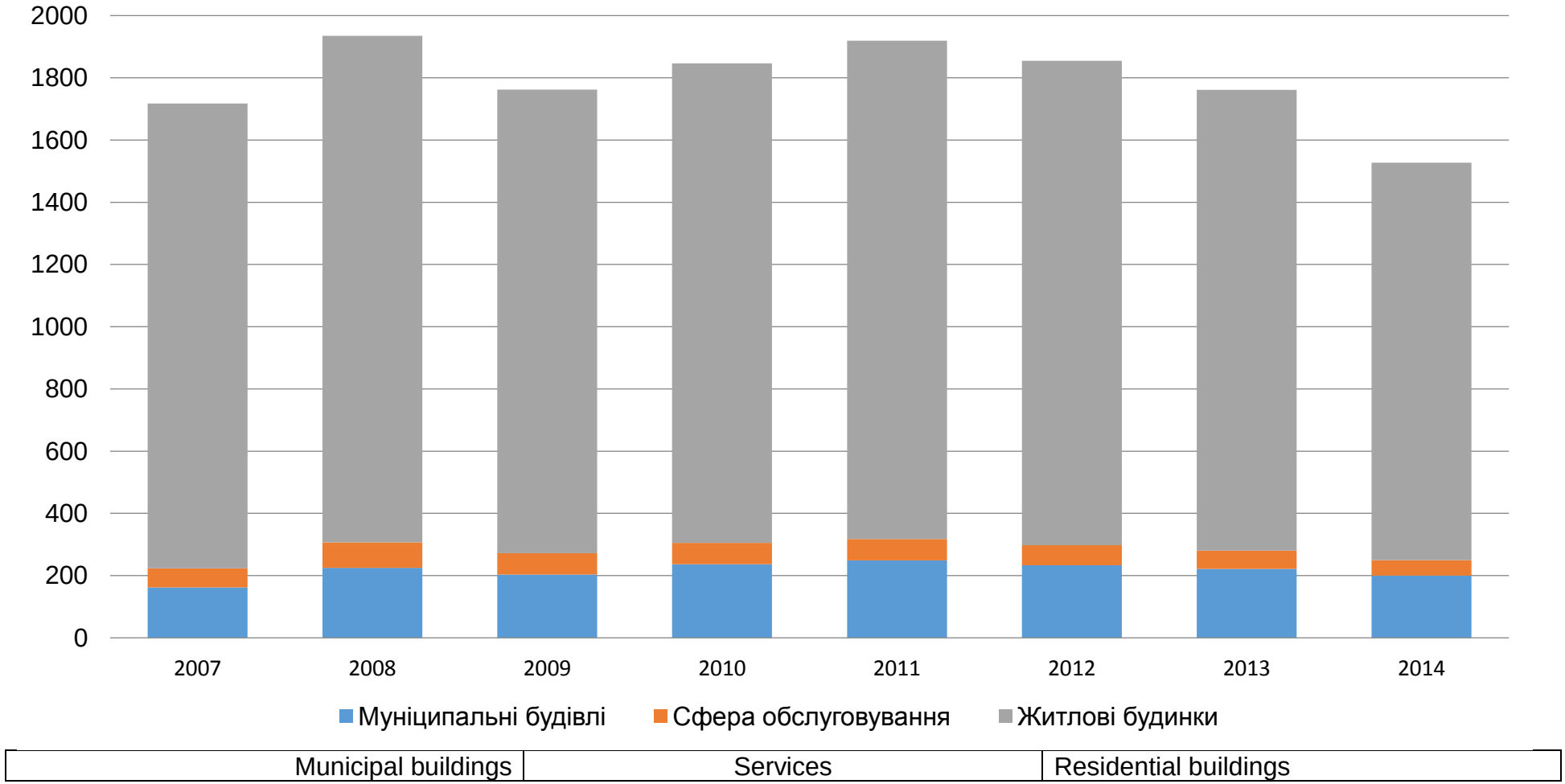
Graph 12. Electricity consumption by sectors in 2008, %.

4.3. Structure of consumption of thermal energy

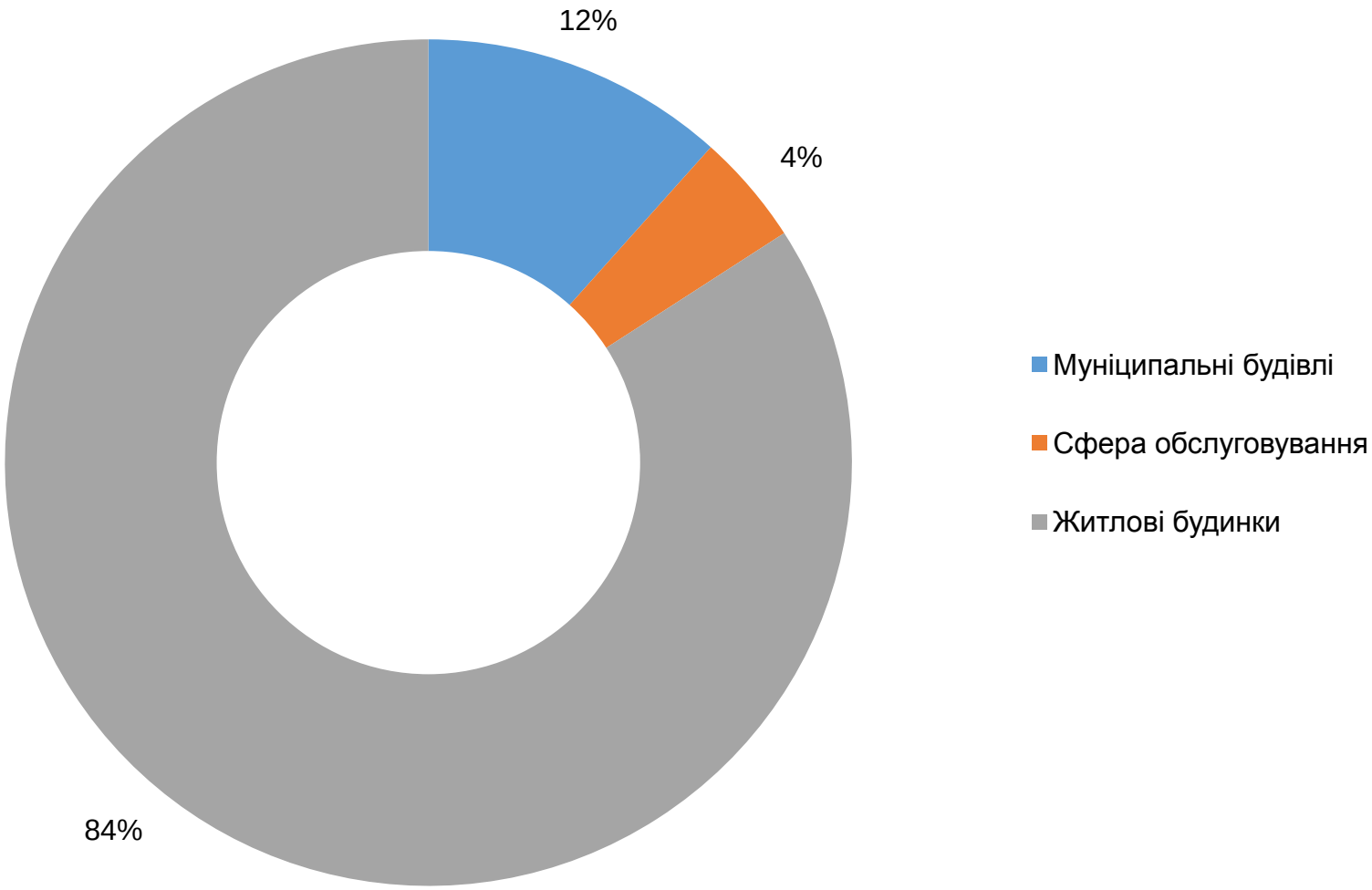
Consumption of thermal energy in Odessa, thousand GCal

Table 5

Sector		Municipal buildings	Services	Residential buildings	Total
Year	2007	162,4	60,8	1 494,6	1 717,8
	2008	224,8	82,4	1 627,4	1 934,6
	2009	203,7	68,6	1 489,7	1 762
	2010	236,3	69,1	1 541,2	1 846,6
	2011	248,9	68,6	1 602,1	1 919,6
	2012	233	64,7	1 557,1	1 854,8
	2013	221,4	58,6	1 481,4	1 761,4
	2014	200,4	49,1	1 277,7	1 527,2



Graph 13. Consumption of thermal energy in Odessa, thousand GCal.



Municipal buildings
Services
Residential buildings

Graph 14. Thermal energy consumption breakdown in Odessa, thousand GCal .

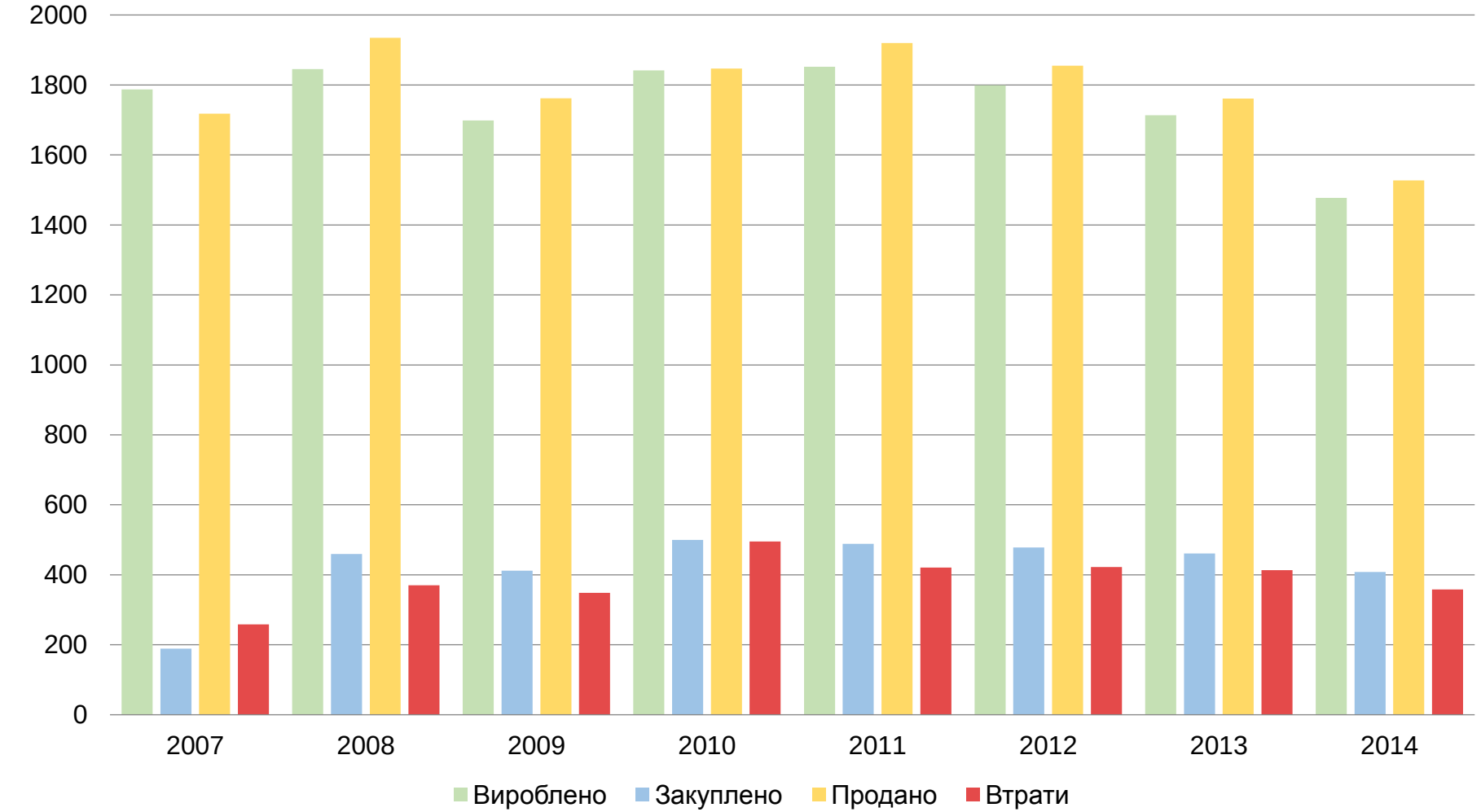
For the purpose of estimation of heat losses in the course of transportation to end users, the table below presents data on generation and purchase of thermal energy by CE TMO and its sale to end users in physical terms.

Energy balance of CE TMO, thousand GCal

Table 6

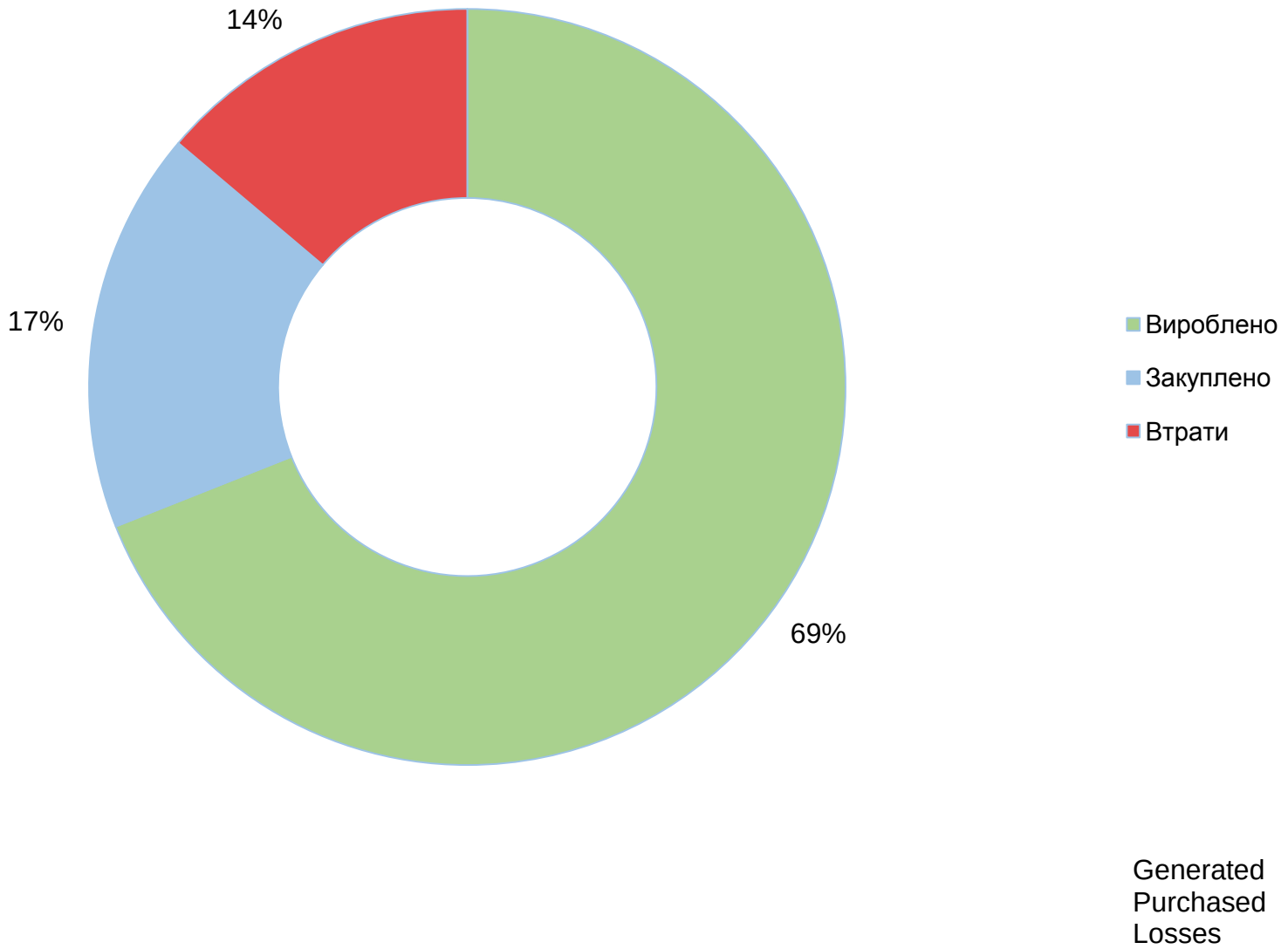
Sector	Year							
	2007	2008	2009	2010	2011	2012	2013	2014
Generated	1 786,9	1 845	1 698,3	1 841,9	1 852,0	1 799,3	1 713,4	1 477,5
Purchased	188,9	459,6	412,0	499,6	488,3	477,8	461,2	407,9
Sold	1 717,8	1 934,6	1 762,0	1 846,6	1 919,6	1 854,8	1 761,4	1 527,2
Losses	258,0	370,0	348,3	494,9	420,7	422,3	413,2	358,2

The losses in the heat supply networks fluctuate in the range of 15-22%. In fact, all thermal energy purchased by CE TMO is sued to cover the losses in the distribution networks. The loss reduction trend is not positive as it results from the drastic fall of the volumes of energy generated.



Generated	Purchased	Sold	Losses

Graph 15. Energy balance of CE TMO, thousand GCal.



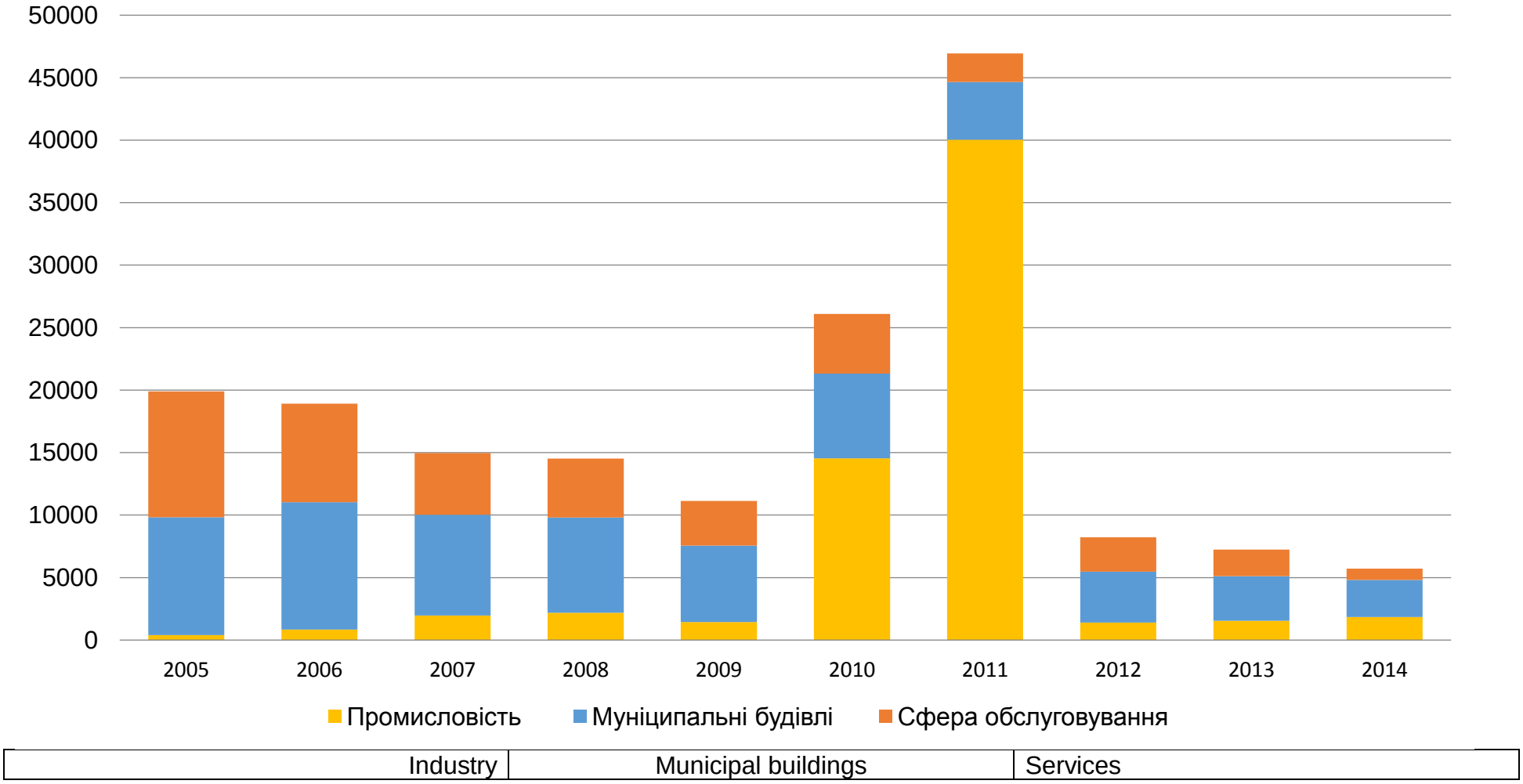
Graph 16. Relative correlation of distribution losses and generation and purchases of heat by CE TMO, %

4.4. Structure of consumption of coal

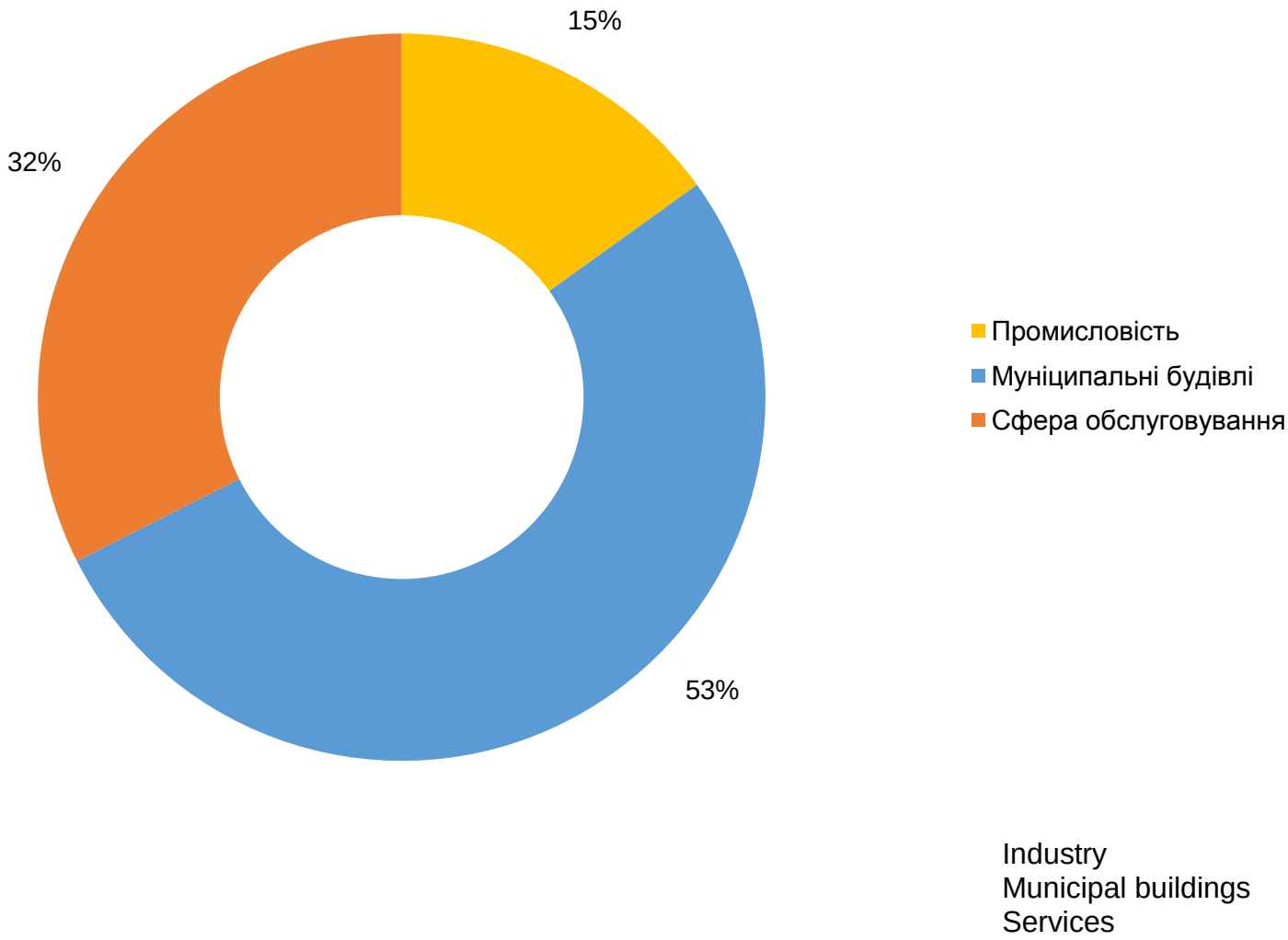
Consumption of coal, tons

Table 7

Sector	Year									
	2005	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**
Industry	399	837,1	1 959,4	2 188,3	1 448,7	14 544	40 036	1 408,8	1 533,9	1 853,5
Municipal buildings	9 426	10 193	8 062,5	7 616,7	6 117,2	6 788,4	4 619,8	4 065,5	3 578,2	2 962,9
Services	10 078	7 877,3	4 939,9	4 707,3	3 557,5	4 767,9	2 285,6	2 748,7	2 122,8	898,1
Total	**19 903**	**18 908**	**14962**	**14512**	**11 123**	**26 100**	**46942**	**8223**	**7 235**	**5 715**

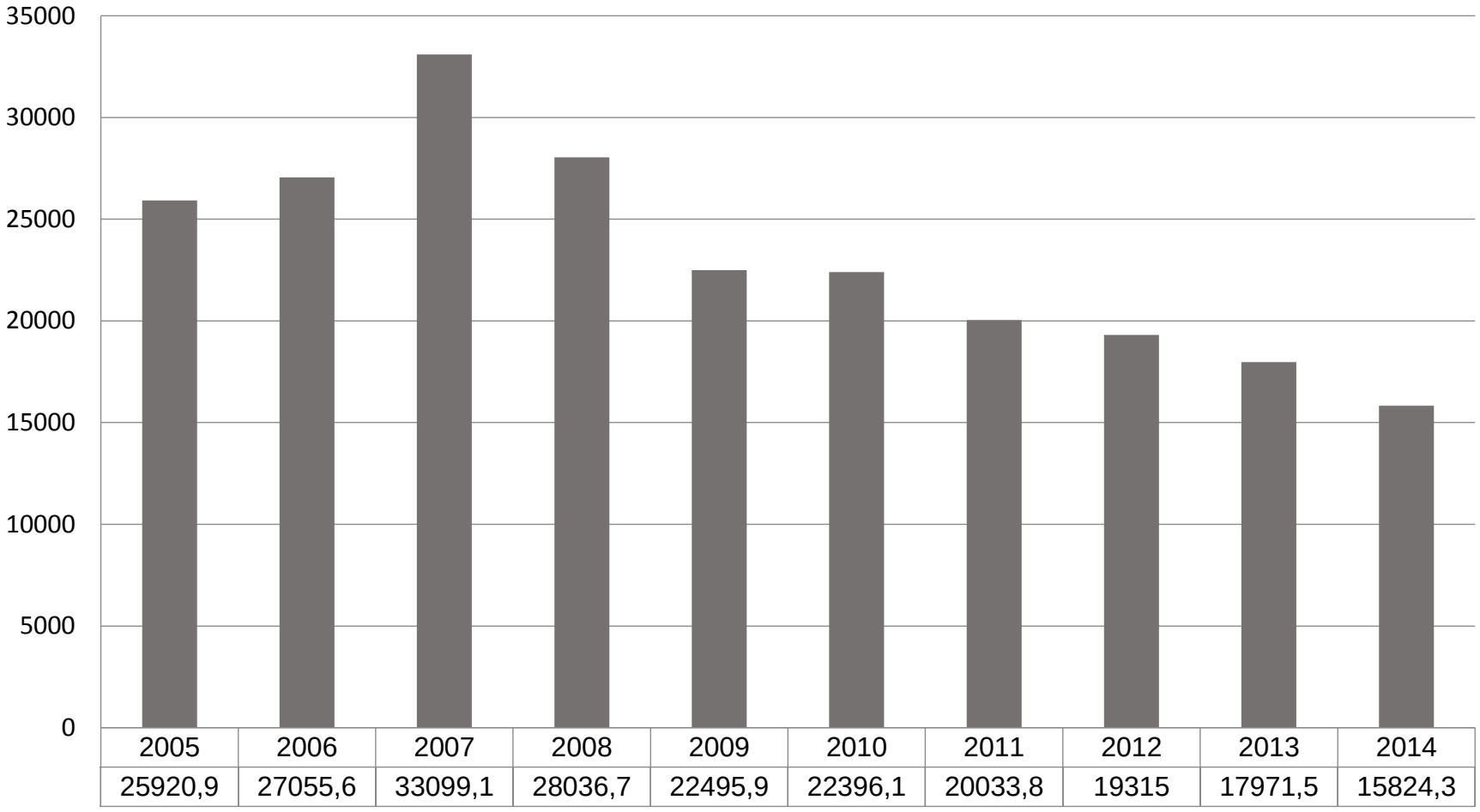


Graph 17. Coal consumption, tons.



Graph 18. Coal consumption breakdown, tons.

4.5. Fuel consumption structure

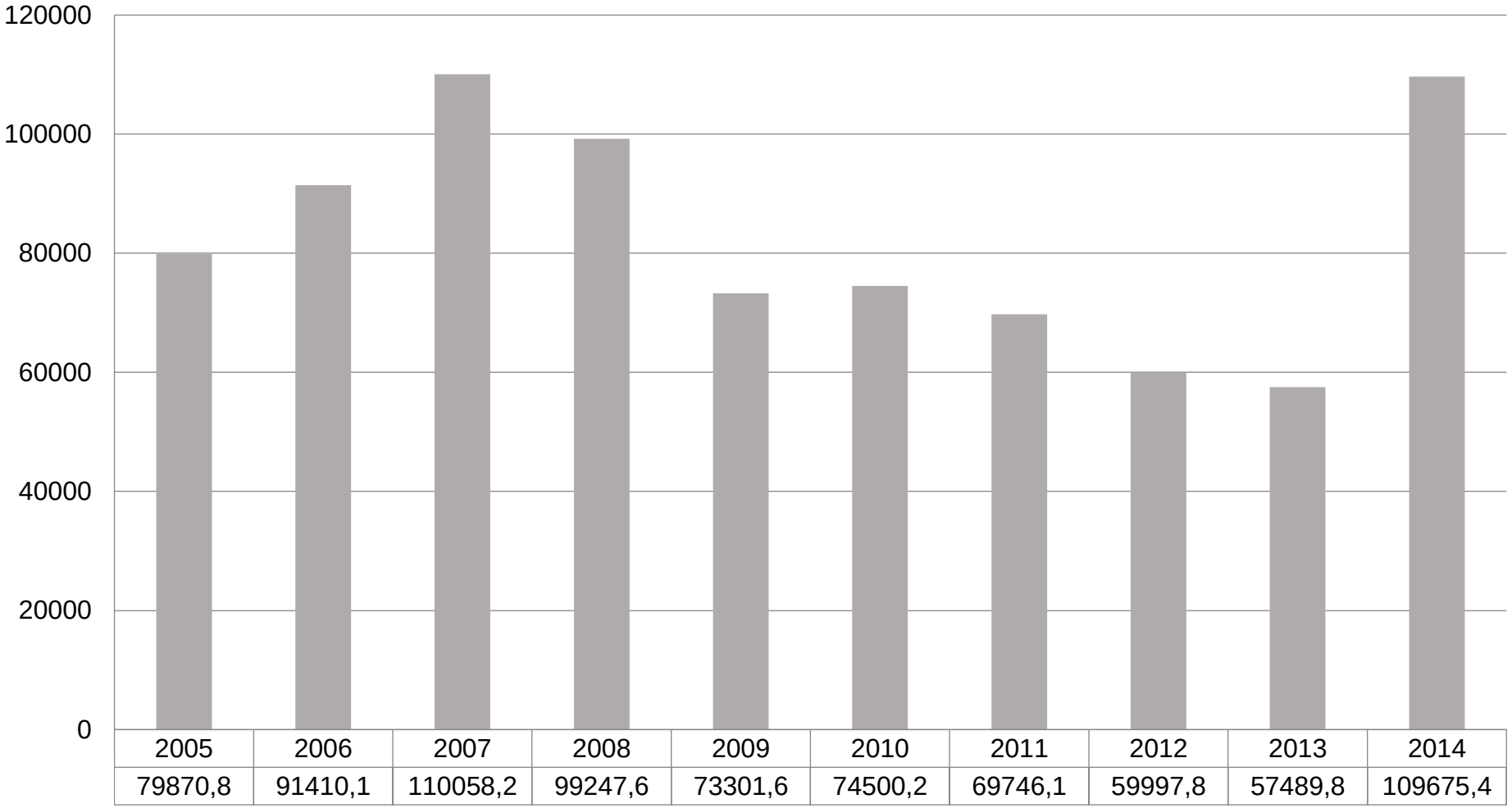


2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
25920,9	27055,6	33099,1	28036,7	22495,9	22396,1	20033,8	19315	17971,5	15824,3

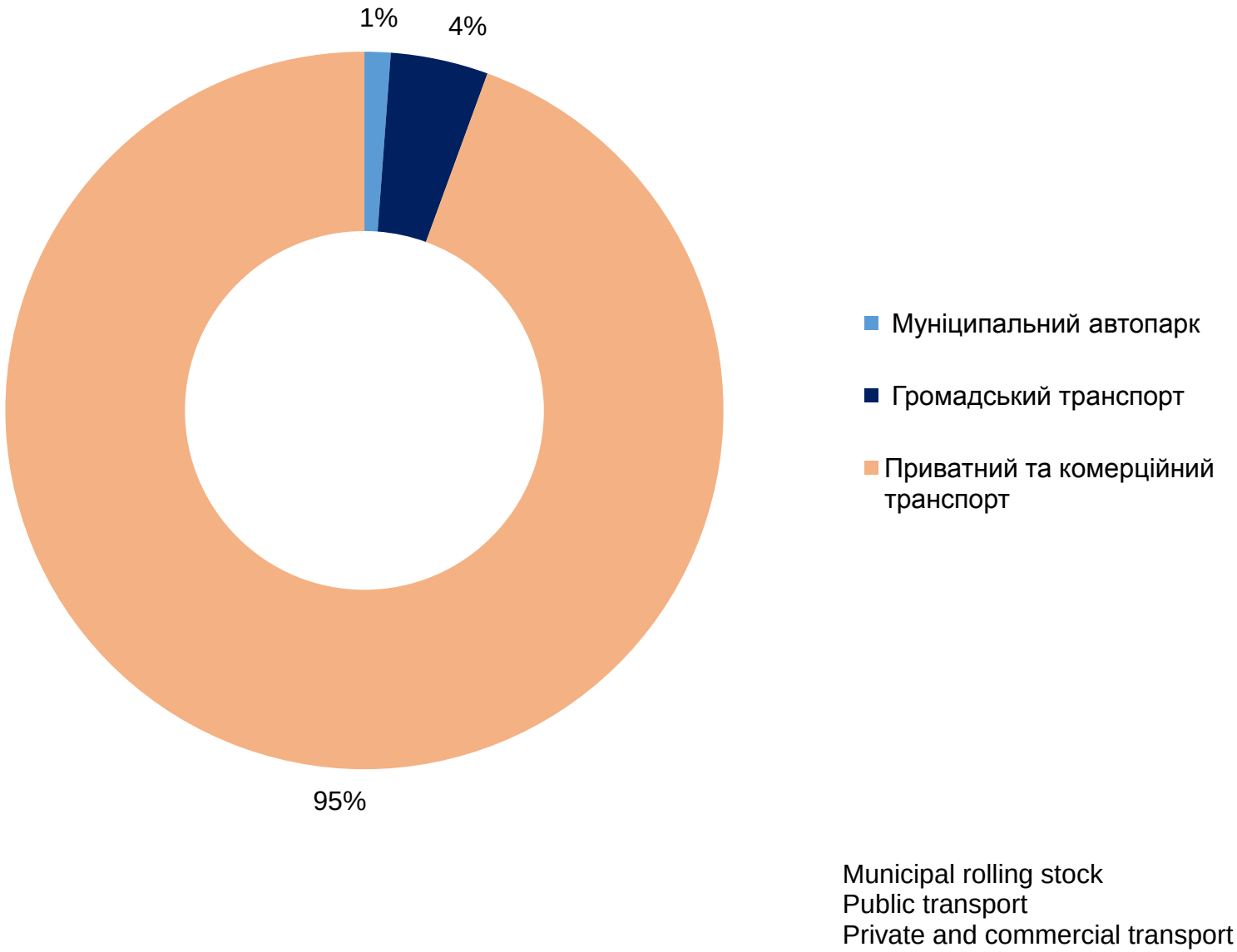
Graph 19. Consumption of motor petrol, tons.

Municipal rolling stock
Public transport
Private and commercial transport

Graph 20. Motor petrol consumption breakdown, tons.



Graph 21. Diesel fuel consumption, tons.

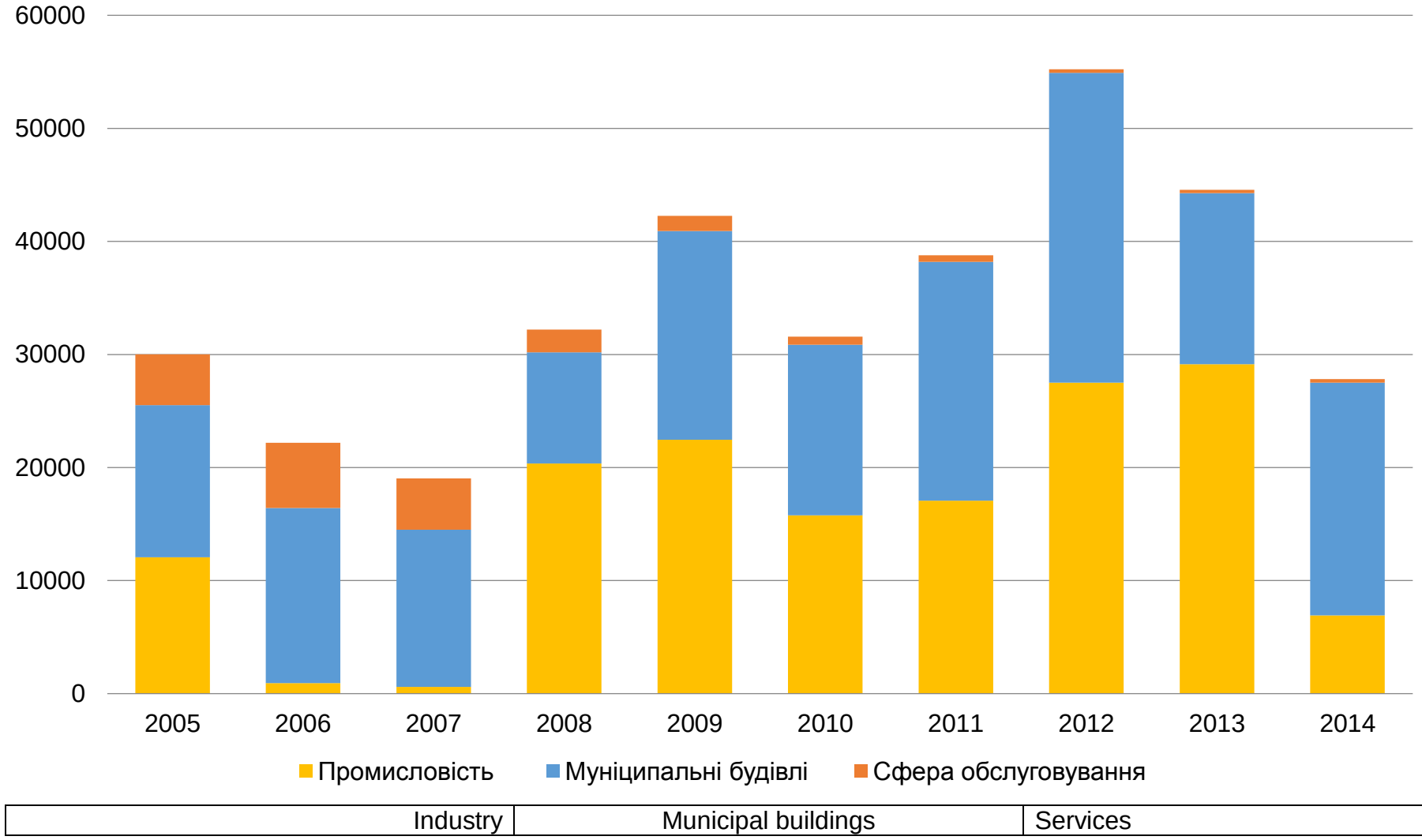


Graph 22. Breakdown of consumption of diesel fuel, tons.

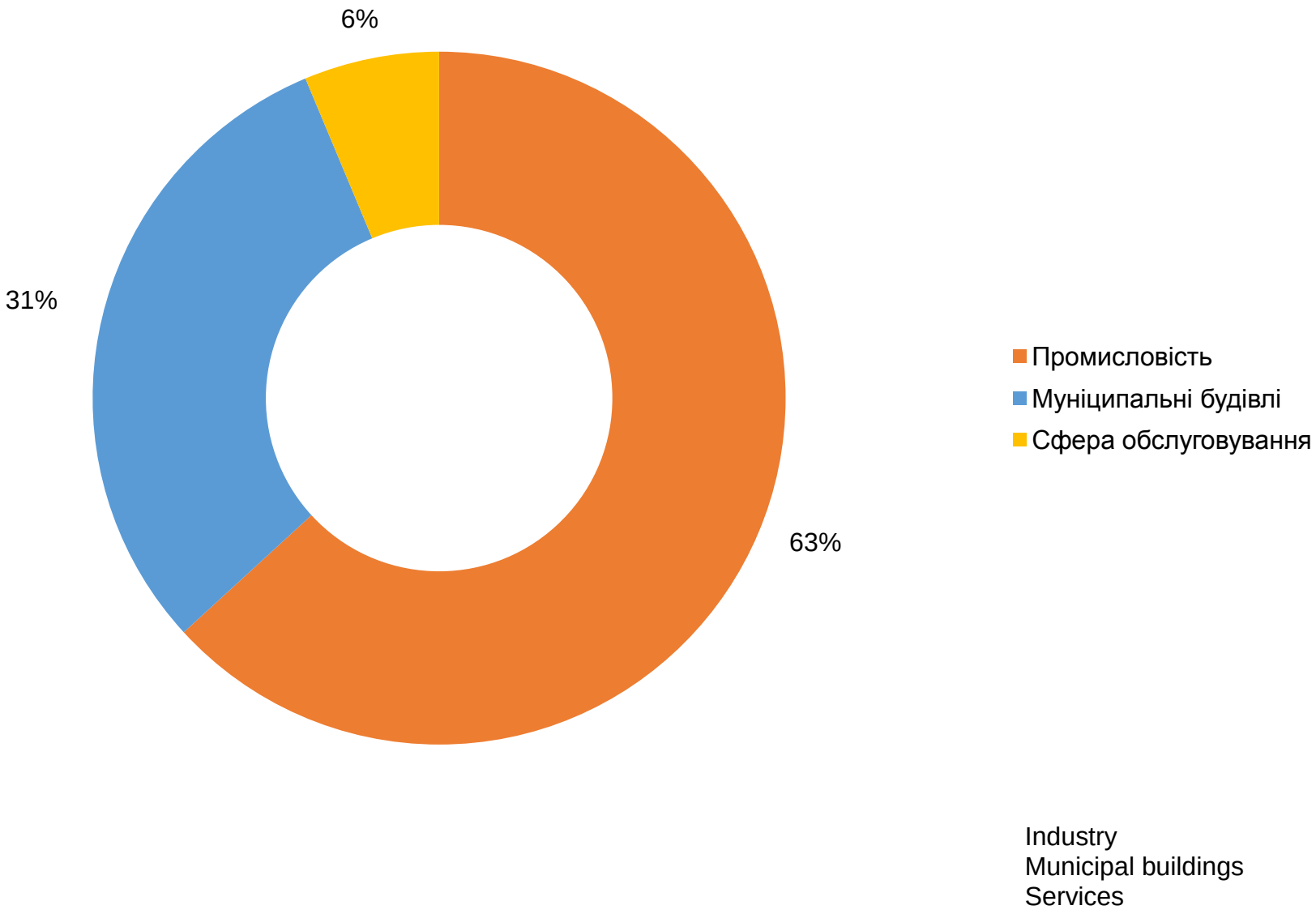
Consumption of heavy fuel oil, tons

Table 8

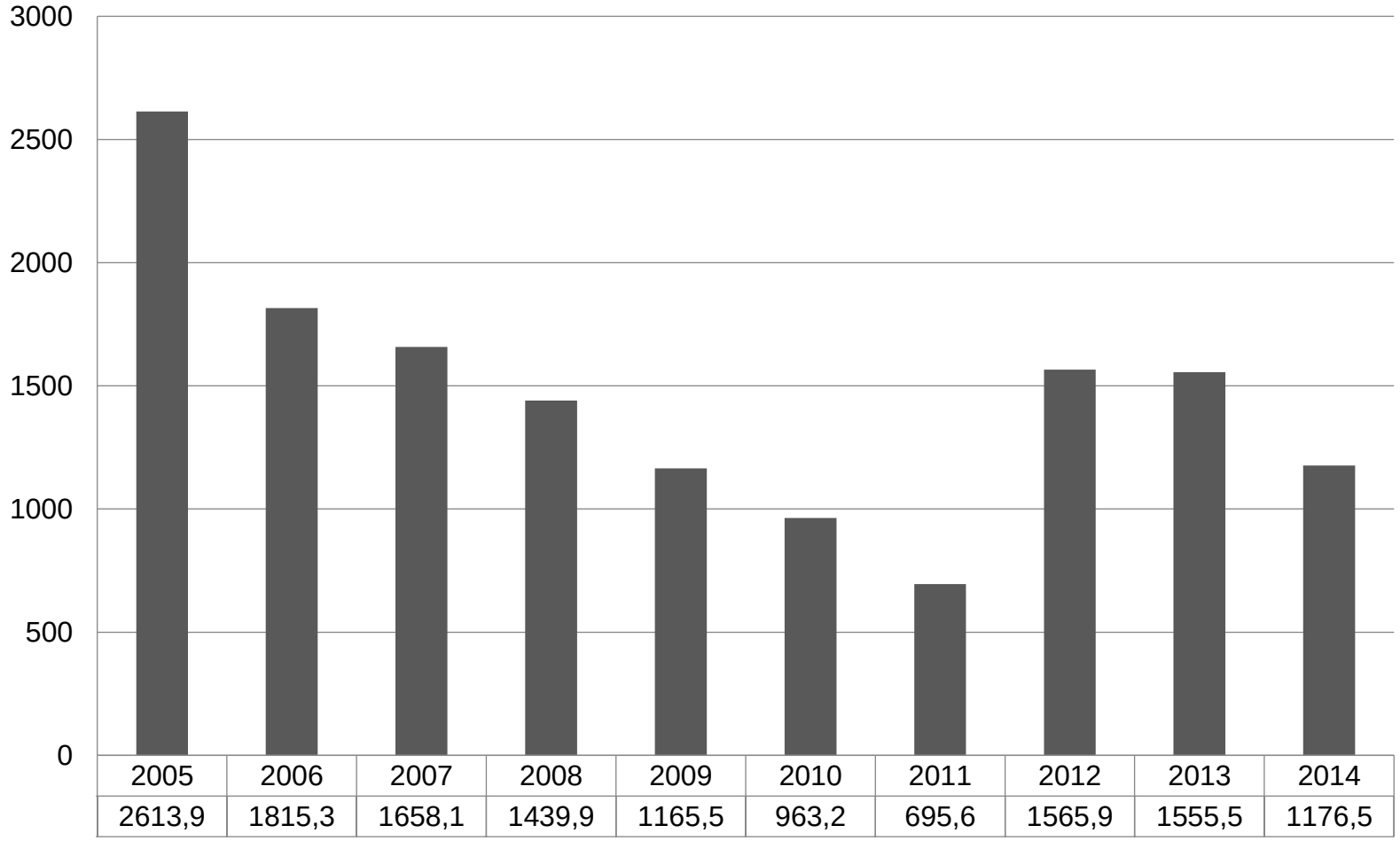
Sector	Year									
	2005	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**
Industry	12 072	928,4	596,5	20 355	22 461	15 777	17 076	27 503	29 138	6 923,3
Municipal buildings	13 451	15 494	1 3895	9 827,9	18 458	15 082	21 113	27 405	15 127	2 0593
Services	4 485,4	5 771	4 547,6	2 030,9	1 342,3	724,5	576,8	316,1	304,2	300,9
Total	**30 009**	**22 194**	**19 040**	**32 214**	**42 261**	**31 584**	**38 765**	**55 224**	**44 569**	**27 817**



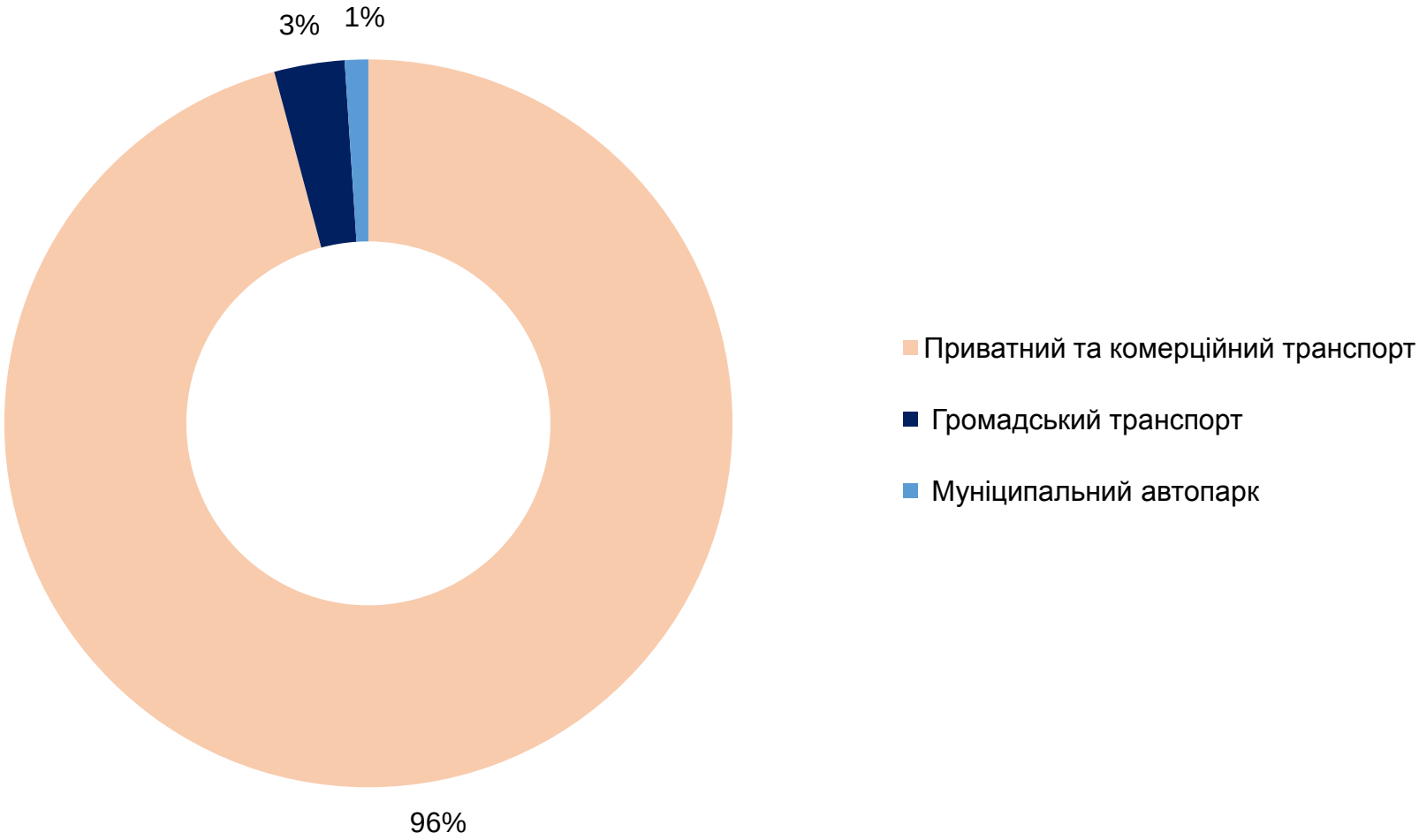
Graph 23. Consumption of heavy fuel oil, tons.



Graph 24. Breakdown of consumption of heavy fuel oil, tons.



Graph 25. Consumption of liquefied propane and butane (LNG), tons.



Private and commercial transport
Public transport
Municipal rolling stock

Graph 26. Breakdown of liquefied propane and butane (LNG), tons.

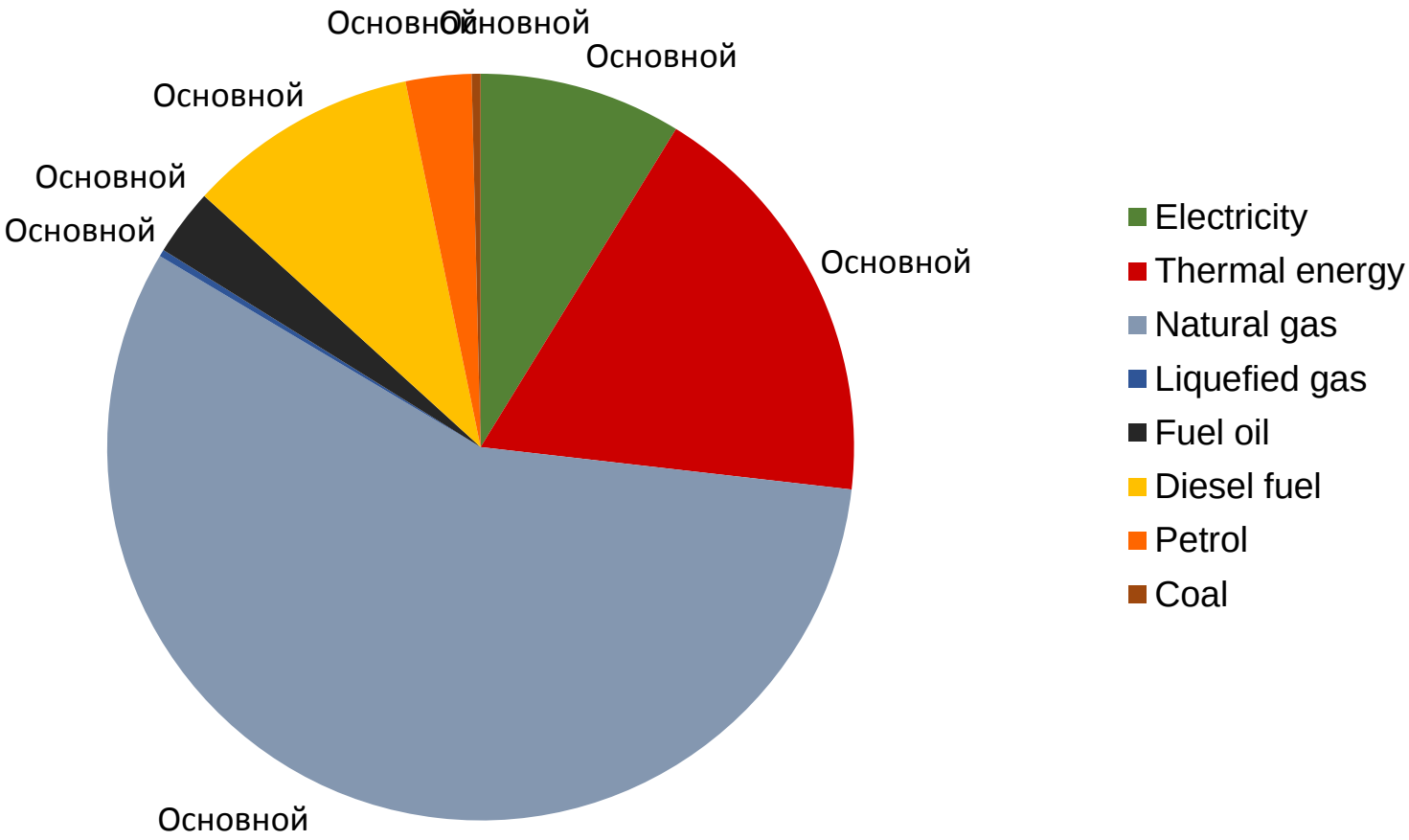
4.6. Structure of energy consumption by consumer categories

For the purposes of comparison of consumption of the energy resources, all of them were converted into one unit – MW-hour.

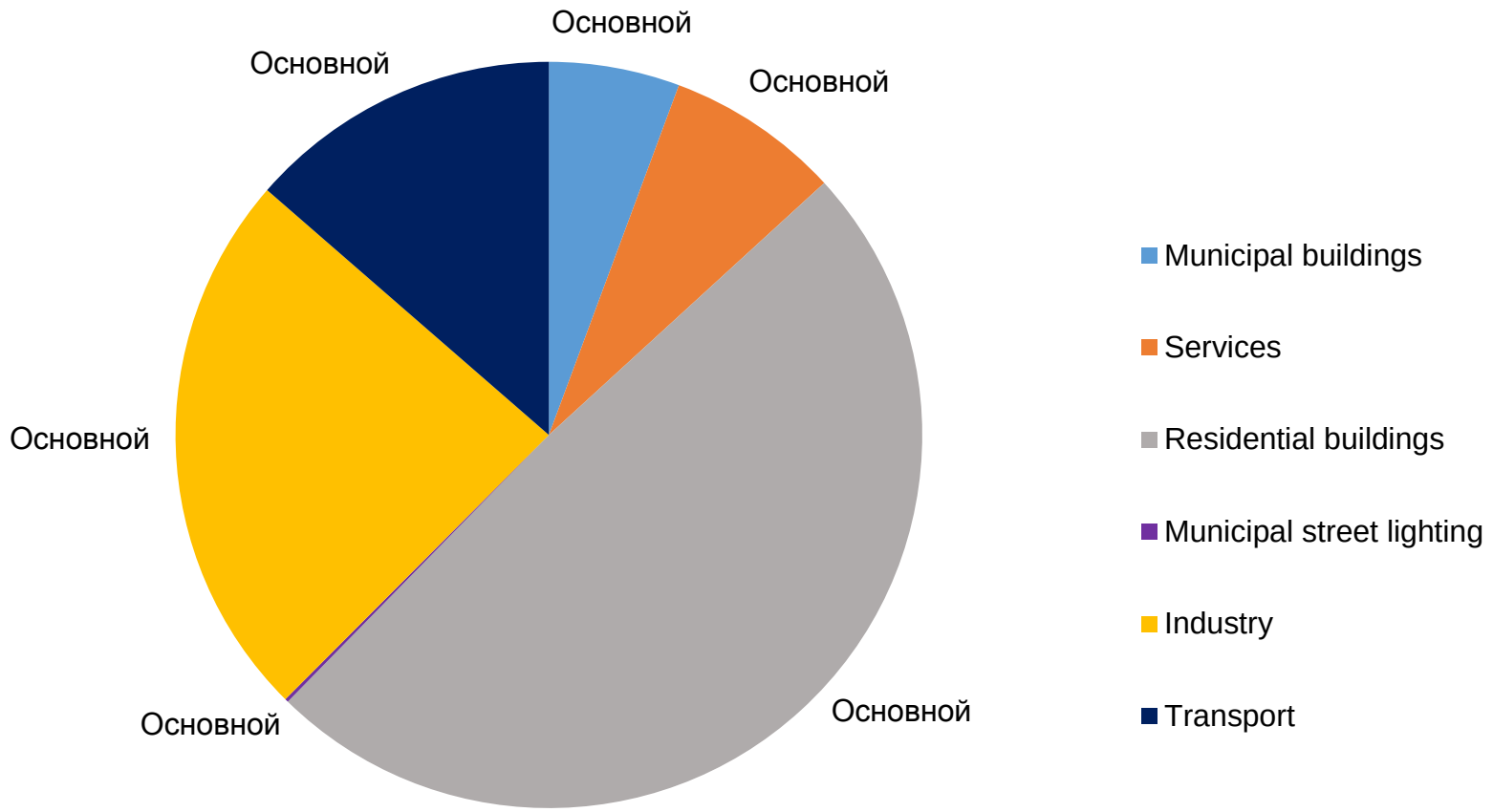
Energy consumption by consumer categories.

Table 9

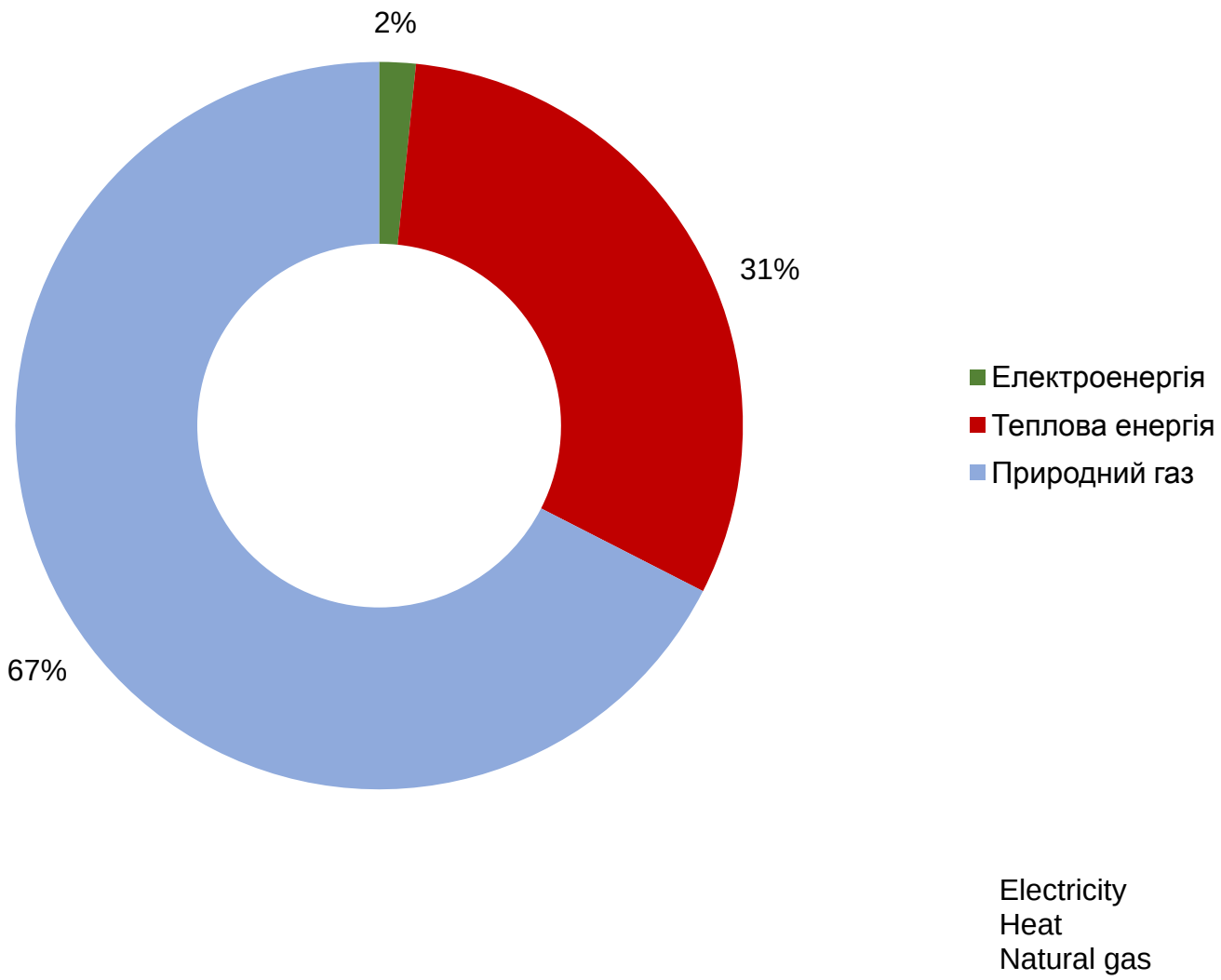
Energy resource	Sector						
	Municipal buildings	**Services**	**Residential buildings**	**Municipal street lighting**	**Industry**	**Transport**	**Total**
Electricity	147 326,10	358 906,60	99 186,80	18 277,40	39 6506,10	72 840,20	1 093 043,20
Heat	261 442,40	95 831,20	1 892 666,20	0	0	0	2 249 939,80
Natural gas	161 437,49	440 297,76	4 133 091,57	0	2 339 176,84	0	7 074 003,67
Liquefied gas	769,98	6 237,33	0	0	11 473,44	18 480,76	36 961,51
Fuel oil	110 072,48	22 746,08	0	0	227 977,12	0	360 795,68
Diesel fuel	0	0	0	0	0	1 250 737,63	1 250 737,63
Petrol	0	0	0	0	0	354 491,32	354 491,32
Coal	25 135,11	15 534,09	0	0	7 221,39	0	47 890,59
Total	706 183,56	939 553,06	6 124 944,57	18 277,40	2982354,89	1 696 549,91	12 467 863,40



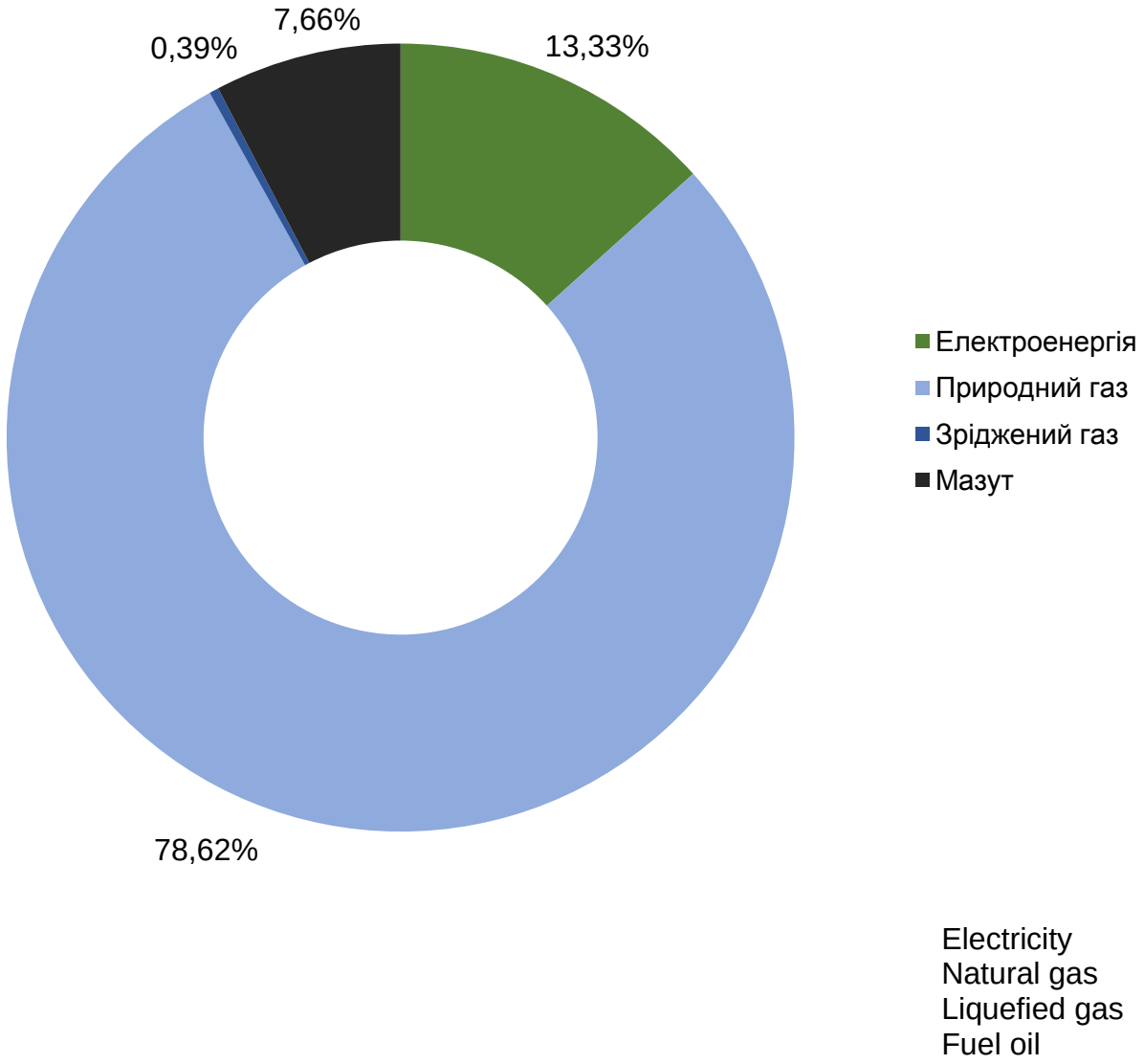
Graph 28. Breakdown of energy consumption in Odessa by energy resources.



Graph 29. Breakdown of energy consumption in Odessa by sectors.



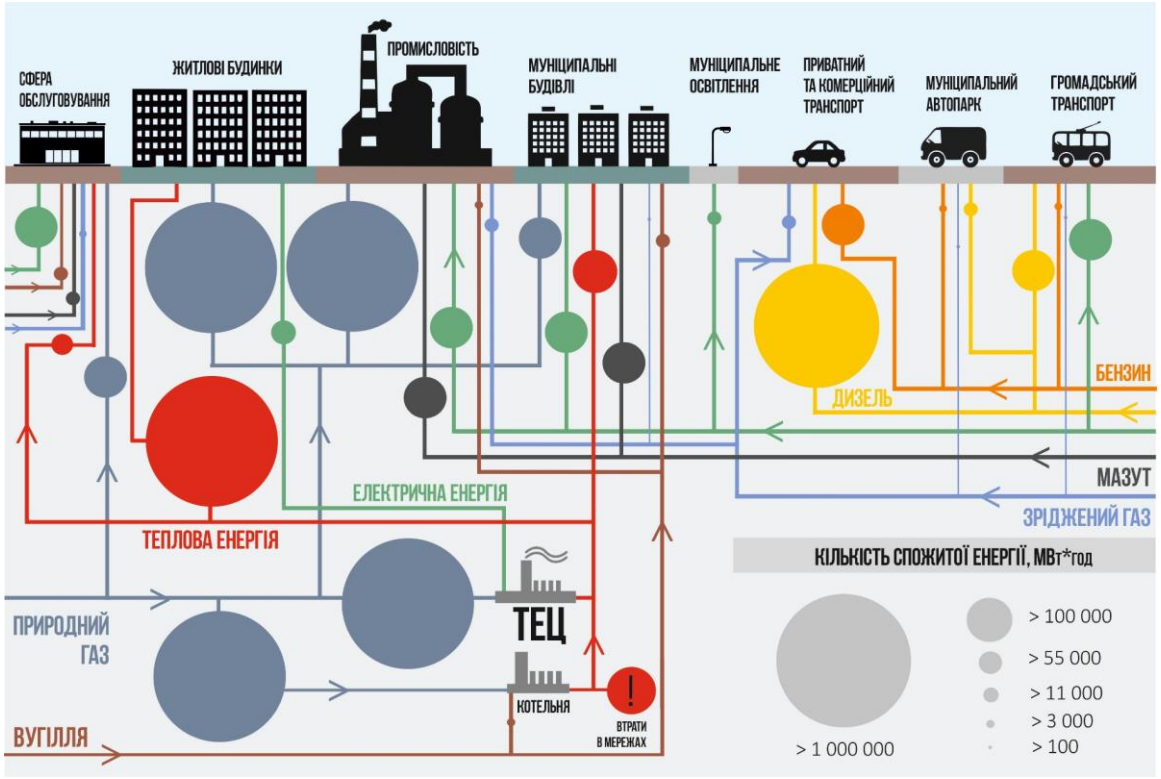
Graph 30. Breakdown of energy consumption by Odessa's sector of residential buildings.



Graph 31. Breakdown of energy consumption by Odessa's industry sector.

In total, energy consumption by different sectors of Odessa economy may be presented graphically as follows:

Services	Residential buildings	Industry	Municipal buildings	Municipal lighting	Private and commercial transport	Municipal rolling stock	Public transport



Diesel **Petrol**

Electricity **Fuel oil**

Heat **Liquefied gas**

Natural gas **CHP** **VOLUME OF ENERGY CONSUMED, MW-HOUR**

Coal **Boiler station** **Losses in networks**

Graph 27. Energy consumption in Odessa, general scheme.

General conclusions regarding energy consumption in Odessa:

- the main energy resource consumed is natural gas, the second and the third important are thermal energy and diesel fuel accordingly;
- the main energy consumer is the sector of residential buildings, the second and the third largest are industry and transport accordingly;
- the top priority attention should be focused on the natural gas consumption (for individual heating and hot water preparation) and thermal energy (heat) for residential buildings;
- the heat losses in the heating networks are covered by heat purchases from CHP and constitute over 100,000 MW/year;
- 90% of all fuel is consumed by private and commercial transport.

5. Organizational aspects of implementation of energy efficiency policy in the City

5.1. Organizational and structural activities for preparation and implementation of the Sustainable Energy Action Plan of the City of Odessa until 2030 (SEAP)

The general structure of mutual responsibilities and assistance in preparation of SEAP is presented in Graph 33.

European Commission	City Council	Sustainable Energy Development Agency		GIZ
	Executive Committee	Odessa Municipal Energy Agency		Klaus Hoppe Consulting
Working Group Residential buildings	Working Group City infrastructure and street lighting	Working Group Municipal buildings	Working Group Industry	Working Group Transport

Graph 32. SEAP organizational structure.

The SEAP was prepared based on the agreement between Deutsche Gesellschaft fur Internationale Zusammenarbet (GIZ) GmbH and Odessa City Council as part of the Project "Establishment of Energy Agencies in Ukraine". Within the framework of this GIZ activity, the contract was signed with the Sustainable Energy Development Agency LLC that provided services on organization and drafting of the Plan. The task of proper communication and cooperation at the local level was assigned to Odessa Municipal Energy Agency. The external expert with the supervisor's role in the process was Mr. Klaus Hoppe. As a result of joint efforts, more than 5 iterations of the final

document were made. The package of measures that were collected and prepared for implementation in Odessa with the aim of achievement of the commitments undertaken was discussed during the meetings of 7 working groups that consisted of the specialists representing relevant sectors. Proposals and comments were taken into consideration and relevant changes were made to the measures. The quintessence of these activities became the public heating when any active citizen of Odessa could express his or her opinions and proposals for improvement of the SEAP.

The proposals made during the meetings or sent via e-mail during 2 weeks upon their completion to the focus group representatives have been integrated into this document.

5.2. Monitoring and control

5.2.1. Administrative monitoring

Monitoring and control consist of the processes used so that potential problems could be identified in a timely manner and corrective measures could be performed, as well as for the implementation control purposes. The main accomplishment is regular review and evaluation of the project progress in order to identify deviations from the SEAP (Graph 33).

Monitoring and control include:

1. Measuring current implementation of the project's objectives (where are we now?)
2. Monitoring of the project's variables (contents and limits of the project, costs, etc.) in comparison with the project management plan and basic plan of project implementation (where do we have to be?)
3. Identification of corrective actions for the purpose of correct resolution of the open issues and risks (how can we bring the actual implementation status in conformity with the planned?)

• Mechanism of "improvement in action" • Analysis of the situation to prevent it in the future • Decision-making on improvements	• Organizational structure • Process modeling • Performance indicators • Regulatory documents
Improvement	**Modeling**
Control	**Implementation**
• Control of deviations of key indicators • Monitoring of processes • Operational control	• Automatic assigning of the tasks to implementers • Clear definition of rules • Performance indicators • Time control

Graph 33. Control of SEAP implementation.

Structure of Odessa City Council as of October 2016

Organizational Chart
of Odessa City Council

City Mayor H.L.Trukhanov	Odessa City Council *(63 Council Members, 5 factions)*
	Executive Committee *(16 members)*

Department of Information and PR	Vice Mayor A.Y. ORLOVSKYI	Deputy Mayor A.I. KOTLIAR	Deputy Mayor V.I. SHANDRYK	Deputy Mayor O.B.YANCHUK	Deputy Mayor Z.M.TSVIRINKO	Deputy Mayor P.V.VUHELMAN	Administrative Officer O.S.ONISCHENKO	Council Secretary O.Yu.POTAPSKYI
Legal Department	City Economy Department	Municipal Security Department	Municipal Property Department	Division for development of consumer market and protection of consumers' rights	Department of Culture and Tourism	Economic Development Department	Department for Citizens' Applications	Organizational Department
Finance Department	Kyivskyi District Administration	Department of Ecology and Development of Recreation Zones	Division of Engineering Protection and Coastline Development	Advertising Division	Department of Labor and Social Policy	Department of International Relations	Department of Accounting and Reporting	Commission for Reinstatement of Rights of Rehabilitated Persons
Department of Provision of Administrative Services	Malynovskyi District Administration	Internal Policy Department	Division of Architecture and Urban Development	Municipal Company Malynovskyi Market	Department of Education and Science	Department of Analytics and Control	Department of Archives and Document Management	
Chief Specialist on Secrecy Regime	Prymorskyi District Administration	Department of Transport, Communications and Traffic	Inspectorate of State Architectural and Construction Control	Municipal Company Pryvoz Market (in the process of liquidation)	Healthcare Department	Division for Cooperation with Citizen Self-Organization Bodies	Department of Documentary and Organizational Support	
Municipal Company "Pravo"	Suvorovskyi District Administration	Department of Defense, Civil Protection and Cooperation with Law-Enforcement Bodies	Division of Capital Construction	Municipal Service for Development of Trade	Service for Children's Affairs	Agency of Odessa Development Programs	Administrative and Maintenance Department	
Odeskyi Visnyk Newspaper Editorial Office	Municipal Company Vyzivsky Housing Office	Sector for Organization of the Work of the Administrative Commission	Road Management Division	Odessa Advertising Municipal Company	Division of Physical Culture and Sports	Odessa Municipal Energy Agency	HR Section	
Municipal Company City Information and Analytics Center	Municipal Company Chornomorsky Housing Office	Municipal Company OdessaTrans-ParkService	Division for Protection Cultural Heritage		Municipal Company Tourist Information Center		Section for Organizational Support of the City Mayor	
Municipal Company Odessa City Printing House	Municipal Company Cheremushky Housing Office	Municipal Security Company	Municipal Company - Bureau of Technical Inventory		Municipal Company OdessaPharm		Section for Organizational Support of the City Top Management	
Municipal Company Odessa Engineering Networks	Municipal Company Khmelnitsky Housing Office	Municipal Company Odessa International Airport	Municipal Company - City Land Management Center		Municipal Company - Spartak Stadium		Section for Organizational Support of the City Mayor	
Specialized institution for provision of free primary legal assistance	Municipal Company Fontansky Housing Office	Municipal Company Odessa Electric Transport	Land Cadastre Bureau of the Division of Land Resources (in the process of liquidation)		Historic Toponymy Commission		Automobile Transport Authority	
	Municipal Company Porto-Frankivsky Housing Office	Specialized Assembly and Operation Unit	Municipal Service of Communal Property		State Emergency Epizootic Commission		Service for Maintenance of Administrative Buildings	
	Municipal Company Pivnichny Housing Office	Reserve Civil Defense Units	Municipal Company - Odessa Project		Sanitary and Epidemiology Service			
	Municipal Company Peresypsky Housing Office	City Service for Emergency Situations (Service 077)	Municipal Capital Construction Company		Veterinary Service			
	Municipal Street Lighting	Municipal Company -	Municipal Company					

	Company - OdessaMiskSvitlo	Odessa Coastline	"Prokhidny k" (in the process of liquidation)					
	Odessa Electrotechnical Operation Company	Luzanivka Hydropark (in the process of liquidation)						
	Municipal Heating Supply Company	Municipal Company "Langerone" (in the process of liquidation)						
	Municipal Company - Servicing Center	Municipal Company "Uzberizhya" (in the process of liquidation)						
	Municipal Tree Planting Company	Municipal Company of Kyivskyi District (in the process of liquidation)						
	Municipal Road Maintenance Company	Center of Ecological Problems and Initiatives						
	Specialized Company for Utility and Household Services	Rescue and Diving Service						
	Municipal Agency for Housing Privatization	Commission for Technogeneou s and Environmental Safety and Emergency Situations						
	Municipal Company OdessaComunTra ns							
	Odessa Fuel and Energy Company							
	Municipal Company - Parks of Odessa							
	Municipal Housing Maintenance Office 18 (in the process of liquidation)							
	RAF-PLUS LLC							
	ECOGRAD LLC							
	Odessa-Gas PJSC							
	OdessaOblEnergy PJSC							
	Branch of Infox LLC							
	Eco-Renaissance LLC							
	Remondis Ukraine LLC							
	Soyuz LLC							
	OdesLift OJSC							
	Odessa CHP PJSC							
	Renaissance Ltd 92							
	Unified Municipal Settlement Center LLC							

Specific responsible persons have been appointed for efficient control of implementation of relevant technical or administrative measures who will be held liable for untimely or poor-quality implementation in accordance his or her functional role and effective legislation of Ukraine.

In compliance with the obligations undertaken, the City Council will submit reports once in two years to the Central Office of the Covenant of Mayors in the progress of implementation of the measures contained in this SEAP.

5.2.2. Responsibilities and tasks

All tasks envisaged by this Plan are relevant to the current policy of the State in the area of energy efficiency, as well as Ukrainian legislation. The Law of Ukraine "On Local Self-Government in Ukraine" is used as a basis.

Persons in charge of task implementation may change during the SEAP implementation period due to political or regulatory processes in the country. Implementers of individual items in the Plan are departments, sections, officers, private companies, etc., whose functional roles cover the tasks or who have the facility in question under their supervision.

The duty of SEAP implementation was undertaken by the City Council who bears the main responsibility and exercises the main control.

Within the framework of cooperation between GIZ and Odessa City Council, the Odessa Municipal Energy Agency was established within the Municipal Company - Agency of Odessa Development Programs in April 2015. The specialists were selected based on the open selection procedure and the selection was completed in May 2015.

Already on 19 June 2015 the first successful result was achieved by the Odessa Municipal Agency: the majority of members of Odessa City Council voted for the resolution to join the Covenant of Mayors – the European initiative aimed to overcome the climate change consequences with involvement of local government bodies.

In August 2015, the Mayor of Odessa issued an official order to Odessa Municipal Energy Agency to develop the Sustainable Energy Action Plan and prepare the concept of the municipal system of energy management including the mechanisms of energy monitoring.

6. System of energy management in Odessa

6.1. Energy monitoring

Monitoring of consumption of energy resources by all public institutions of the City is performed by the system of daily monitoring of energy consumption by public and municipal institutions of Odessa - "Energobalance". For all participants of the process (527 public institutions of the City), representatives of the Odessa Municipal Energy Agency and the Executive Committee of Odessa City Council organized introductory training on major aspects of energy management with a focus on daily monitoring of energy consumption.

Graph 34. Homepage of the "Energobalance" online program.

The main goal of the use of "Energobalance" software is to monitor and control the efficient use of thermal energy, gas, electricity, water and sewerage by public institutions, provide information and coordinate the actions for implementation of the energy saving measures aimed to reduce the financial burden on the budget due to the energy bills of public institutions.

The unified information system of e-monitoring allows:

1. Collection and systemization of information on the consumption of all energy and water resources by all public institutions of the City within a unified electronic database using Web technology.

2. Multi-user work within the single database in the real time mode.

3. Manual and automatic reading of the data on consumption of the energy and water resources.

4. Multifaceted analysis of consumption of energy resources:

a) comparative analysis of the buildings within the same group (kindergartens, schools, hospitals, etc.);

b) analysis of consumption of energy resources by individual buildings;

c) analysis of money flows within a building or a category;

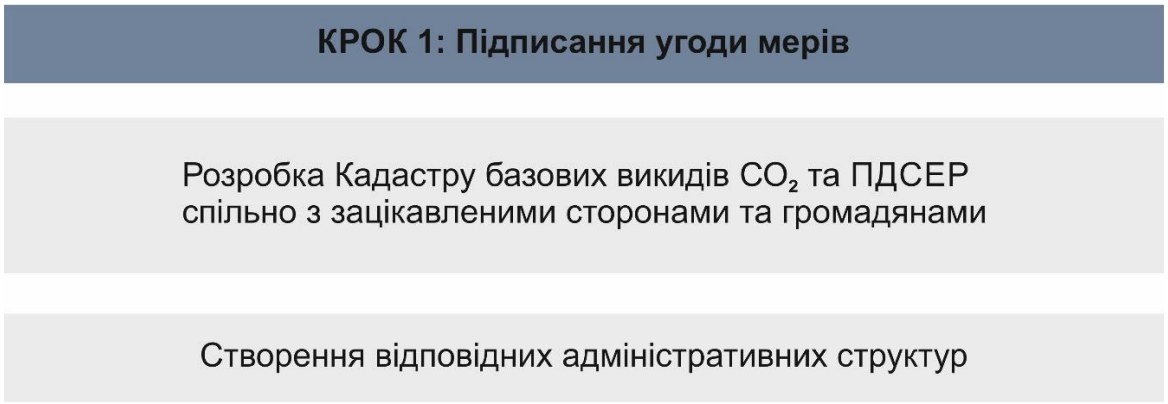
d) determination of the building's energy efficiency index with preparation of a relevant information poster;

e) analysis of consumption of energy resources and water both in natural and specific values;

f) prompt information for the City management on the real condition of the consumption of energy resources with the breakdown by public institutions and key spending units of budget funds;

g) support of managerial decision-making on funding of energy efficiency measures within institutions.

6.2. Main algorithm of the Covenant of Mayors



STEP 1. Signing of the Covenant of Mayors
Preparation of the CO2 emission inventory and SEAP in cooperation with stakeholders and citizens
Creation of relevant administrative structures

STEP 2: Submission of the SEAP
Monitoring and reporting
Implementation of the SEAP
STEP 3: Regular submission of implementation reports
Reduction of CO2 emissions by 20% until 2020

6.3. Regulatory and legal framework

In the area of energy efficiency, there are about 250 legislative acts and bylaws effective in Ukraine.

At the moment, more than 50 national standards are applied within the Energy Saving group.

Considering the future adaptation of Ukrainian legislation to EU legislation, which is an international obligation envisaged by the Law of Ukraine "On Ratification of the Protocol of Ukraine's Accession to the Treaty Establishing the Energy Community", the City representatives will keep tracking new opportunities and restrictions.

In February 2011, Ukraine acceded to the Treaty Establishing the Energy Community. The Treaty envisaged that the Parties to the Energy Community (EnC) are obligated to fulfill the decision of the Ministerial Council of the Energy Community passed jointly by the Parties. Among those decisions, there are decisions of the Ministerial Council aimed to improve the efficiency of use of the natural resources in the EnC countries. For this purpose, three EU Directives have been identified that may be applied to the Treaty Parties. Based on that, the Ministerial Council of EnC passed the Decision No. 2009/05/MP-EC of 18 December 2009 "On Implementation of Some Energy Efficiency Directives". Later, as some of the European Union Directives were

replaced with new documents, relevant amendments were made in 2010 and 2011 to the Decision No. 2009/05/MP-EC based on the decisions of the EnC Ministerial Council No. 2010/02/MC-EnC of 24 September 2010 and No. 2011/03/MC-EnC of 6 October 2011. Thus, taking into account the amendments Ukraine, as one of EnC Treaty Parties, has to incorporate the following EU directives into its legislation:

• Directive of the European Parliament and of the Council 2006/32/EC of 5 April 2006 on efficiency of the end use of energy and energy service, as well as cancellation of the Council Directive 93/76/EEC;

• Directive of the European Parliament and of the Council 2010/30/EU of 19 May 2010 on indication of the energy consumption volumes and other resources by energy-consuming products via marking and standard information on the goods;

• Directive of the European Parliament and of the Council 2010/31/EU of 19 May 2010 on energy characteristics of the buildings.

Recommendations on the necessary steps to ensure the compliance with the energy efficiency directives may be seen on the Ecoclub website by the link in the footnote[2].

6.4. Financial instruments

Funding of implementation of technical and organizational measures within the project is planned from different sources depending on the implementation area and the project's end recipient. The SEAP includes both existing funding mechanisms and the mechanisms that will have to become available during 2016 - 2017.

Below, we will discuss all funding sources:

6.4.1. State Budget

As the entire state policy is aimed to reduce consumption of energy resources, a number of programs have been adopted and planned for implementation in all areas of economic activities in the entire territory of the state. The list of measures also includes projects from Odessa that will be funded from the State Budget.

6.4.2. Funds of private investors

It is planned that funds of private investors will be mobilized for funding of their projects in the Plan.

6.4.3. Own funds of companies

Own funds of the companies engaged in generation and transportation of thermal energy and energy-intensive material resources, particularly, depreciation charges and income, would be the cheapest and most reliable and affordable source of funding of the capital investments.

6.4.4. Donor funds (grants)

Usually, the grant funds for implementation of infrastructure investment projects are made available to the cities and companies participating in the international technical assistance projects that have this component among their tasks. Since grants represent non-repayable targeted funding, the funds allocated as grants for funding of investment projects are very limited and mostly aimed to financing of demonstration projects and/or pre-project research. Nevertheless, it is quite possible that extension of powers and increase of efficiency of energy management allows involving grants in the short and medium-term period for financing of soft measures, demonstration and pilot projects. This is the most preferable source for the short-term period. Therefore, local governments have to activate the work on attraction of the maximum possible volume of grants into the city's energy efficiency.

Currently, there is a number of donor organizations to cooperate with: European Bank for Reconstruction and Development (EBRD), Nordic Environment Financial Corporation (NEFCO), European Investment Bank (EIB), Horizon Capital, Europe Virgin Fund LP, Western NIS Enterprise FUND (WNISEF), IB Contacts, SUDeP, Global Environment Facility (GEF), Nordic Investment Bank (NIB), Global Climate Partnership Fund (GCPF), Dutch International Guarantees for Housing (DIGH), International Finance Corporation (IFC), US Agency for International Development (USAID), World Bank, Demo Ukraina DH, KfW, German development bank, INOGATE, ENPI, European Neighborhood and Partnership Instrument, GIZ (German Organization for International Cooperation), European Ukrainian Energy Agency (EUEA), Energy Efficient Cities of Ukraine (EECU), Swedish International Development Agency (SIDA), US Embassy, FLEX (Future Leaders Ex-change Program), International Renaissance Foundation, Hans Seidel Stiftung, Robert Bosch Stiftung and MitOst e.V.; Friedrich

Naumann Stiftung für die Freiheit; Konrad Adenauer Stiftung; Friedrich Ebert Stiftung; German Embassy; the Lemelson Foundation; Eurasia Foundation, East Europe Foundation; the British Council; John Smith Program; World Bank; USAID; National Democratic Institute (USA); Ford Foundation; U.S. Civilian Research & Development Foundation; Kyiv School of Economics; Foundation for Development of Ukraine; SIDA; The Polish-Czech-Slovak Solidarity Foundation; Soros Grant Programs; Royal Society International Program (UK); UNISEF; AIESEC; Caritas Ukraine; Foundation for Support of Authors of Humanitarian and Social Initiatives "Dreams Come True"; Ukrainian Jewish Foundation; United Nations Development Fund for Women (UNIFEM); Local Government Support Fund; Stefan Batory Foundation.

6.4.5. Bank loans

The most common form of financing of investment projects in the area of efficient use of energy should be bank loans - both internal (for short-term projects) and external (for medium-term projects), as well as the credits of international financial institutions and foreign public institutions, such as, the World Bank, IFC, EBRD, EIB, KfW and others (for medium and long-term investment projects).

6.4.6. Commercial (commodity) credit

Commercial credit is a commodity form of credit provided by sellers to buyers as a deferral of payment for the goods sold or services rendered. Due to commercial credits, buyers receive temporary savings of funds and reduce the need of a bank loan. In most cases, commercial credits have a short-term nature. Specific terms and amount of the credit depend upon the type and cost of the goods, financial situation of the contractors and market conjuncture.

6.4.7. Financial leasing

Financial leasing is one of the most reliable tools regulated by legislation for attraction of funding of the medium-term investment projects in the area of generation, transportation and supply of thermal energy. There is a number of positive practices of the practical use of this tool.

6.4.8. Concession

The most efficient form of implementation of the long-term investment projects in the area of reduction of the fuel and energy consumption is public-

private partnership in the form of concession. Concession is when an authorized executive body or a local self-government authority gives the right to a legal entity or an individual (entrepreneurial subject) to create (construct) and/or manage (operate) the object of concession (limited paid possession) based on the concession agreement for the purpose of satisfaction of public needs, on condition that the entrepreneurial entity (the concessionaire) undertakes obligations to establish (construct) and/or manage (operate) the object of concession, property liability and possible business risks.

6.4.9. Revolving fund for financing of energy efficiency projects

For stimulation of the process of attraction of private investments into energy efficiency of public buildings and facilities, as well as ACMBs, there is a need of financial support from local self-government bodies.

Since legislation does not provide guarantees of actual allocation of funds for funding of capital investments from relevant budgets when implementation of those investments is planned during the period that exceeds one calendar year, this source is unstable for long-term investment projects. The principle of functioning of the revolving fund consists in provision of funds to relevant business entities for the purposes of financing of the energy efficiency programs with subsequent return of those monies to the fund, among other things, out of the savings of energy resources as a result of technical modernization, improvements or introduction of innovative technologies. In this way, multiple use of monies from the fund is possible for implementation of energy saving measures and gradual accumulation of the monies.

It is envisaged to establish the revolving fund in the medium term and finance energy efficiency projects out of that source.

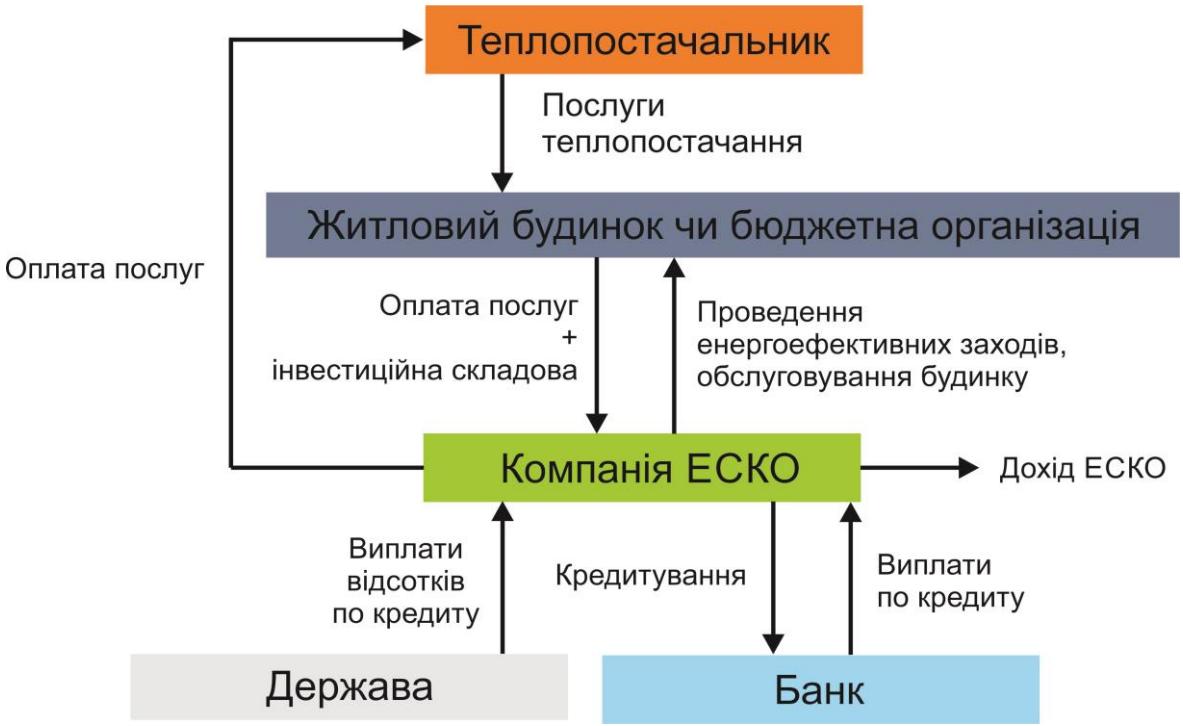
6.4.10. Involvement of private capital – Energy Service Contracting mechanism (ESCO)

Involvement of private capital into funding of the long-term investment projects in the area of consumption of thermal energy may be performed in the following ways:

1. Funding is mobilized by the contracting company (implementer of the renovation works) while an Association of Co-Owners of the Multi-Family Building (ACMB) is granted a deferral of payment for the works performed.

2. Funding is mobilized by a company that provides the building with certain utility services (ESCO) and the ACMB enters into a long-term contract for provision of such services exclusively by that company.

The ESCO mechanism is shown in Graph 35.



	Heating supplier	
	Heating supply services	
Payment for services	Residential building or public institution	
	Payment for services + Investment component	Energy efficiency measures, servicing of the building
	ESCO	ESCO's income
Payment of interest on the loan	Crediting	Loan repayment
`	STATE	BANK

Graph 35. ESCO mechanism.

The idea of the proposed scheme is to use actual savings of the funds during the future periods after thermal modernization of the buildings for attraction of a loan for the thermal modernization. The estimates prove that savings of the residents' payments for heat after the deep thermal modernization of the buildings within 15 years will excess the investments needed for that thermal modernization. The above estimates prove the existence of a financial scheme where the sums for repayment of the loan

for thermal modernization of the pilot residential and public buildings do not reduce current payments of the residents and budgets for the heating supply services. On the contrary, there is a possibility to reduce those payments effectively. It is also important to train the employees of Odessa City Council to ensure the good quality of implementation of relevant projects and prevent any deception by energy service companies in the course of settlements and execution of agreements

6.4.11. Targeted NEFCO loan for municipalities

In accordance with its Energy Saving Crediting Program, NEFCO provides loans to UAH 3 million for the period to 5 years. The interest on the loans is 3% p. a. It should be noted that the loans are targeted and may be only used for implementation of energy saving projects in the city's municipal sector.

6.4.12. E5P targeted loan and grant

In 2011, the Fund of the Eastern Europe Energy Efficiency and Environment Partnership (E5P Fund) started working in Ukraine. Within the framework of the International Energy Partnership (IEP), there is a possibility to use monies from this Fund.

E5P Fund issues preferential loans against 4-6% for funding of energy efficiency projects through international financial organizations that participate in the Fund. Also, the Fund may provide grants in addition to the loans in the amount of one third of the loan. This combination is very advantageous from the financial standpoint as it allows enhancing the project's financial indicators by financing the least bankable project measures out of the grant and thus improving its payback.

It should be noted that the funds obtained from E5P are of targeted nature and should be fully spent for implementation of energy efficiency projects.

6.4.13. Development budget (DB)

Within the framework of the SEAP budget planning, it is assumed that the funds of the development budget would also be used for funding of the measures and projects under the SEAP. Nevertheless, it should be taken into account that a part of the development budget will be spent for servicing of the loans that are planned to be obtained. Therefore, affordable spending from DB was forecast for repayment of the principal amounts of the loans.

For the remaining years of the SEAP, funding was planned in accordance with the forecasts of availability of funds in the City's development budget with revision and adjustment once in each 2 years. It would be unrealistic to assume that all available funds in the development budget would be spent for financing of the SEAP. Therefore, within the framework of planning for the needs of SEAP only a part of available funds was allocated out of the development budget. The size of that part was set by the City's specialists based on their own forecasts.

6.4.14. State Energy Efficiency Fund

A specific feature of the State Energy Efficiency Fund (EE Fund) should be involvement of the subsidies for housing and utility services received by more than 30% of Ukrainian households into the system of funding of energy efficiency projects in buildings. Thus, a part of the funds that are currently earmarked in the State Budget for those purposes may be used for investments into energy efficiency measures. Moreover, according to the practices of the Central and Eastern Europe creation of the EE Fund, technical support of the project implementation and development should be accompanied by active participation of donors and international financial organizations.

One of the pre-conditions for establishment of the EE Fund should be the statutory approval of the mechanism of its ongoing financing and implementation of relevant EU directives. The report to be presented will create the basis for the uniform strategy and joint efforts of many participants of the process: The Ministry of Finance of Ukraine, the Ministry of Social Policy of Ukraine, the National Energy and Utilities Regulation Commission, Naftogaz NJSC, the Ministry of Fuel and Energy of Ukraine, the Ministry of Economic Development and Trade of Ukraine, the World Bank, IMF, EIB, EBRD. The EE Fund's mandatory components should be the transparent Steering Committee, Supervisory Board, Technical Office and international audit. It is planned to complete the EE Fund's creation in 2017.

General recommendations:

The number of financial instruments that allow achieving the savings of energy resources continuously grows. The main priority for financing of measures should become investment of the saved funds into new energy efficiency projects. The activities should not turn into search for grants. The main factor in the selection of the funding scheme should be its transparency, measurability of final results and economic rationale.

6.5. Political will

Political tools of the city administration for implementation of energy saving measures are as important as financial resources, staffing potential and technical component of the projects. Implementation of technical measures that are not supported with political tools (aid from the municipality for the people who participate in the renovation) is not realistic. The political tools shown in Graph 36 with regard to regulation, promotion and support refer to all target groups and categories of consumers of energy resources (residents of multi-family panel and brick buildings, small apartment blocks, and visitors of public buildings).

Political instruments		
Regulation	Encouragement	Support
Standardization	Tax benefits	Information support
Certification		Consulting services
Control	Payment for actual consumption	Energy management
Sanctions		

Graph 36. Political instruments that may be used by the municipality.

Regulation measures for stimulation of the use of energy resources should start with introduction of tight standards for heat consumption by buildings. This process should be ongoing. The standards need to be revised taking into consideration the new energy situation and technical possibilities. In

addition, efficient use of energy resources requires establishment of the system of control of compliance with the standards and quality of materials used, with the authority to impose strict economic sanctions on violators. One of effective measures to stimulate efficient use of energy resources by the City's public institutions is development of economically justified limits for consumption of energy resources and utility services for said institutions, as well as control of their compliance.

Among encouragement measures, the most important but also difficult for implementation is the principle of payment for energy based on actual consumption. It requires introducing the metering of heat consumption by individual apartments, which requires proper technical solutions with the view of centralized heating supply. Implementation of energy saving measures with long payback periods requires involvement of funds from banks. This involvement may be facilitated, for instance, by repayment of the loan interest out of the local or the state budget.

Powerful levers for the municipality's motivating function are local taxes, tariffs and support programs. Local taxes and tariffs may be used both for restriction of undesirable behavior in the area of efficient use of energy, and for the support of socially useful activities. Using those tools, it is possible to influence the methods of construction or new buildings and reconstruction of existing ones, as well as the use of renewable energy sources, etc. The support programs may be based on financial or moral incentives. For improvement of efficiency of management of the housing stock, adequate policy is needed at the municipal level in the following areas:

- Formation of the ongoing financial policy in the area of housing stock management;
- Creation of "efficient" owners in the residential sector;
- Development of housing management business.

Support. To ensure efficient use of energy resources and sustainable development, the municipality in the partnership with the private sector, non-government and community-based organizations, as well as consumers, need to:

- Stimulate education of citizens, city council members, administrators (who set political priorities for social development) in the topics of improvement of the energy consumption efficiency and environmental protection;

- Facilitate adoption of municipal planning and project decisions that would envisage efficient use of energy and properly incorporate the needs of end users;
- Support the use of energy efficient technologies;
- Support development and production of energy saving equipment and technologies;
- Develop cooperation with other cities (including those abroad) for exchange of knowledge and experiences in the area of introduction of energy saving technologies;
- Stimulate the use of energy saving and environmentally safe technologies and materials during reconstruction of existing buildings and new constructions;
- Promote the use of solar energy, passive ventilation and higher quality of heat insulation of buildings, etc.

Despite the fact that behavior and decisions of residents as to the efficiency of use of energy resources in their own apartments are not within the municipality's direct control and the city administration does not have any direct tools to influence the behavior or energy consumers, it still can get them interested or set restrictions, reward or apply sanctions, that is, motivate their behavior. The municipality should keep working with the residents in order to inform them on the ways to improve efficiency of use of energy resources in residential buildings. There are various forms and methods of the motivating influence on the end users of energy for the purpose of the voluntary reduction of the consumption including that for the purposes of the building retrofit. The most typical ones are:

- dissemination of information and programs on specific topics through media for increase of the residents' interest;
- opening of information bureaus on energy issues that are accessible for individuals and various organizations;
- dissemination of supporting literature on energy efficiency in buildings;
- publication of bulletins on energy efficiency problems;
- general educational activities at schools (introduction of energy saving lessons);
- consulting support of the technical and financial assistance, control of the quality of planning and implementation of projects;
- implementation of demonstration projects as examples of successful retrofitting of buildings;
- introduction of economic incentives for reconstruction of existing buildings for the purpose of enhancement of their thermal parameters

and change of the consumers' behavior resulting in the reduction of energy consumption;

- promotion of establishment of non-government alternative businesses for operation and maintenance of housing stock;
- development of the network of energy consumers' clubs, etc.

7. Analysis of current condition of greenhouse gas emission and Baseline Emission Inventory

According to the recommendations contained in the Manual for Preparation of the Sustainable Energy Action Plan until 2030, the baseline year chosen for the City of Odessa is 2008. The completeness and reliability of data obtained from various sources became the determining factors for selection of the baseline year.

The sources of statistic data were official responses of the State Statistics Department in Odessa Oblast and the City of Odessa, structural divisions of the Executive Committee of Odessa City Council and specialized companies of Odessa's energy sector.

A challenging aspect of data processing was lack of consistency. For the monitoring report, data must be obtained from at least 2 different sources. Data collection starts in the course of preparation of the monitoring report.

The key CO_2 emission sector is population's energy consumption in residential buildings. The City's industry emits three times less and the transport sector - four times less (with the 90% share of private and commercial transport). In total, these three (3) sectors contribute 77% of all greenhouse gas emissions in Odessa. The share of emissions from combustion of the natural gas in the total energy volume is 36.7%.

Total greenhouse gas emission into the atmosphere is 3,887,744 tons in CO_2 equivalent (3,880 kg in CO_2 equivalent per 1 resident of Odessa in the baseline year).

A. End consumption of energy

Category	END CONSUMPTION OF ENERGY [MW]															
			Fossil fuel								Renewable energy sources					Total
	Electricity	Heating/ Cooling	Natural gas	Liquefied gas	Fuel oil	Diesel fuel	Petrol	Lignite	Coal	Other fossil fuels	Plant oils	Biofuel	Other types of biomass	Solar thermal	Geotherm al	
BUILDINGS, EQUIPMENT, STRUCTURES AND INDUSTRY:																
Municipal buildings and equipment/structures	147326,1	261442,4	161437,4881	769,98	110072,48	0	0	0	25135,11	0	0	0	0	0	0	706183,56
Buildings, equipment/structures, that belong to the third sector (non-municipal)	358906,6	95831,2	440297,7635	6237,33	22746,08	0	0	0	15534,09	0	0	0	0	0	0	939553,06
Residents	99186,8	1892666,2	4133091,575	0	0	0	0	0	0	0	0	0		0	0	6124944,57
Municipal street lighting	18277,4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	18277,40
Industry (except the industry sectors involved in the EU system of emission trade	396506,1	0	2339176,841	11473,44	227977,12	0	0	0	7221,39	0	0	0	0	0	0	2982354,89
Interim indicator: Buildings, equipment, structures and industry	1020203,00	2249939,80	7074003,67	18480,75	360795,68	0,00	0,00	0,00	47890,59	0,00	0,00	0,00	0,00	0,00	0,00	10771313,49
TRANSPORT:																
Municipal rolling stock	0	0	0	192,5	0	14678,01	6220,82	0	0	0	0	0	0	0	0	21091,33
Public transport	72840,2	0	0	577,49	0	55013,18	3419,09	0	0	0	0	0	0	0	0	131849,96
Private and commercial transport	0	0	0	17710,77	0	1181046,44	344851,41	0	0	0	0	0	0	0	0	1543608,62

Interim indicator for transport	72840,20	0,00	0,00	18480,76	0,00	1250737,63	354491,32	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	1696549,91
Total	1093043,20	2249939,80	7074003,67	36961,51	360795,68	1250737,63	354491,32	0,00	47890,59	0,00	0,00	0,00	0,00	0,00	0,00	12467863,40
Municipal procurement of certified green electricity (if any) [MW]:	0															
CO2 emission coefficient for procurement of certified green electricity (for LCA)**:**	0															

B. Emissions of CO2 or its equivalents

Category	**CO2 emissions [t] / CO2 equivalent emissions [t]**															
			Fossil Fuel								**Renewable energy sources**					
	Electricity	**Heat/Cooling**	**Natural gas**	**Liquefied gas**	**Fuel oil**	**Diesel fuel**	**Petrol**	**Lignite**	**Coal**	**Other fossil fuels**	**Biofuel**	**Plant oils**	**Other types of biomass**	**Solar thermal**	**Geotherm al**	**Total**
BUILDINGS, EQUIPMENT/STRUCTURES I INDUSTRY:																
Municipal buildings and equipment/structures	136129,32	104576,96	32610,37	177,87	30710,22	0,00	0,00	0,00	9149,18	0,00	0,00	0,00	0,00	0,00	0,00	313353,92
Buildings, equipment/structures, that belong to the third sector(non-municipal)	331629,70	38332,48	88940,15	1440,82	6346,16	0,00	0,00	0,00	5654,41	0,00	0,00	0,00	0,00	0,00	0,00	472343,71
Residents	91648,60	757066,48	834884,50	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	1683599,58
Municipal street lighting	16888,32	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	16888,32
Industry (except the industry sectors involved in the EU system of emission trade	366371,64	0,00	472513,72	2650,36	63605,62	0,00	0,00	0,00	2628,59	0,00	0,00	0,00	0,00	0,00	0,00	907769,93
Interim indicator Buildings, equipment, structures and industry	942667,57	899975,92	1428948,74	4269,05	100661,99	0,00	0,00	0,00	17432,17	0,00	0,00	0,00	0,00	0,00	0,00	3393955,46
TRANSPORT:																
Municipal rolling stock	0,00	0,00	0,00	44,47	0,00	3919,03	1548,98	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	5512,48
Public transport	67304,34	0,00	0,00	133,40	0,00	14688,52	851,35	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	82977,62
Private and commercial transport	0,00	0,00	0,00	4091,19	0,00	315339,40	85868,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	405298,59
Interim indicator Transport	67304,34	0,00	0,00	4269,06	0,00	333946,95	88268,34	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	493788,69
OTHER:																
Waste management																

Sewer water management																
Other types of wastes																
Total	1009971,92	899975,92	1428948,74	8538,11	100661,99	333946,95	88268,34	0,00	17432,17	0,00	0,00	0,00	0,00	0,00	0,00	3887744,14
Relevant CO2 emission coefficients [t/MW-hour]	0,924	0,4	0,202	0,231	0,279	0,267	0,249	0,264	0,364	0	0	0		0	0	
CO2 emission coefficient for electricity of non-local generation [t/MW•hour]	0,924															

C. Local energy generation and related CO2 emissions

Statistic data are missing on the local generation of electricity by installation with the capacity below 20 MW. This table will be completed in the future together with the next monitoring reports.

Local generation of electricity (except installations participating in the EU emission trade system and all installations/blocks > 20 MW)	Local generation of electricity [MW]	Share of energy resource [MW-hour]										CO2 emissions / CO2 equivalent emissions [t]	Relevant coefficients of CO2 emissions for electricity generation [t/MW-hour]
		Types of fossil fuel					Steam	Waste	Plant oils	Other types of biomass	Other renewables	Other	
		Natural gas	Liquefied gas	Fuel oil	Lignite	Coal							
Wind energy	**0**												**0**	
Hydropower	**0**												**0**	
Photovoltaic	**0**												**0**	
CHP	**0**	0	0		0					0	0		**0**	
Other: _____	**0**	0	0		0					0	0		**0**	
Total	**0**	**0**	**0**		**0**					**0**	**0**		**0**	

D. Local systems of heating/cooling (district heating/cooling, CHP…) and relevant emissions of CO2

Local production of heat/cooling	Local production of heat/cooling [MW-hour]	Share of energy resource [MW-hour]										CO2 emissions / CO2 equivalent emissions [t]	Relevant coefficients of CO2 emissions for heating/cooling [t/MW-hour]
		Types of fossil fuel					Waste	Plant oils	Other types of biomass	Other renewables	Other		
		Natural gas	Liquefied gas	Fuel oil	Lignite	Coal							
CHP	**553588**	1056352,5	0	0	0	0	0	0	0	0	0	**213383,2**	**0,202**
District boiler stations	**2173181,8**	**3400009,34**	0	0	0	6532,02	0	0	0	0	0	**689179,5**	**0,202; 0,364**
Other:_____	0	0	0	0	0	0	0	0	0	0	0	**0**	
Total	**2726769,8**	**4456361,84**	**0**	**0**	**0**	**6532,02**	**0**	**0**	**0**	**0**	**0**	**902562,7**	

8. Technical measures for the period of 2008 - 2020

The technical measures are aimed to achieve the goals set in the framework of implementation of the voluntary initiative under the Covenant of Mayors. The measures have been developed on the basis of the emission inventory, information on the key categories of consumers and types of energy resources consumed in Odessa. The Table contains information on the measures that have already been implemented (marked with *) and those to be implemented in the future, as well as implementers, cost and funding sources, expected results upon implementation.

The Covenant of Mayors was launched in 2008. Therefore, the year 2008 was set as the baseline year for all cities that joined the initiative after 2008 in order to maintain equal starting conditions. For that reason, all projects implemented between 2008 and 2016 have been included into Odessa's Sustainable Energy Action Plan until 2030. Thus, the City confirms that despite the fact that it only signed the Covenant in 2015 Odessa City Council has supported European initiatives by implementing energy saving projects since 2008 and has already made a considerable contribution in the fulfillment of its energy saving obligations that should be taken into account in the summary of results in 2030.

All measures have been presented for discussion within working groups. As a result, a part of them were extended and some new once were added.
Upon approval of SEAP, consumers will keep informing Odessa Municipal Energy Agency of the planned changes and additional measures whereupon those measures may be adjusted and developed further in the course of the subsequent monitoring (two years after approval of SEAP by Odessa City Council) in accordance with the plans relevant by that time.

Key activity areas	**Area of intervention**	**Organization in charge**	**Implementation terms**		**Tentative cost of implementation as of the Plan's approval date (UAH)**	**Tentative cost of implementation as of the Plan's approval date (€)**	**Funding sources**	**Evaluation in 2020**			
			Start	End				Energy saving [toe]	Energy saving [MW]	Renewables generation [MW]	Reduction of CO2 emissions [tons of CO2]
MUNICIPAL BUILDINGS											
Energy and thermo-vision audit of the institutions of education, healthcare, culture, etc.*	City's public institutions	Municipal Economy Department of Odessa City Council, Agency of Odessa Development Programs	2013	2015	680 000	22 667	Municipal budget	0	0	0	0
Installation of equipment for compensation of reactive capacity at healthcare institutions*	City's public institutions	Municipal Economy Department of Odessa City Council	2013	2015	2 100 000	70 000	Municipal budget	105 000	855	0	790
Replacement of out-side lighting with LED units at healthcare institutions*	City's public institutions	Municipal Economy Department of Odessa City Council, relevant department,	2013	2015	5 600 000	186 667	Municipal budget	279 990	2 279	0	2 106

		Agency of Odessa Development Programs									
Replacement of out-side lighting with LED units at education institutions*	City's public institutions	Municipal Economy Department of Odessa City Council, relevant department, Agency of Odessa Development Programs	2013	2015	2 400 000	80 000	Municipal budget	120 000	977	0	903
Replacement of existing windows with energy saving windows at the education, culture and healthcare institutions*	City's public institutions	Municipal Economy Department of Odessa City Council, relevant departments	2013	2015	14 400 000	480 000	Municipal budget	1 020 000	8 304	0	3 322
Installation of electric heat accumulating equipment at pre-school institutions*	City's public institutions	Municipal Economy Department of Odessa City Council, Capital Construction Division of Odessa City Council	2013	2015	2 700 000	90 000	Municipal budget, investment funds	135 000	1 099	0	1 016
Thermal renovation of education and healthcare institutions using modern foam polystyrene for insulation of walls	City's public institutions	Municipal Economy Department of Odessa City Council, Capital Construction Division of Odessa City Council, Agency of Odessa Development Programs	2013	2020	185 000 000	6 166 667	Municipal budget, Oblast budget, ESCO contracting, loans	9 630 036	78 398	0	31 359
Installation of solar collectors for all-year-round hot water supply at children education institutions and healthcare institutions*	City's public institutions	Municipal Economy Department of Odessa City Council, Capital Construction Division of Odessa City Council, Agency of Odessa Development Programs	2013	2015	2 400 000	80 000	Municipal budget	120 010	0	977	903
Installation of heat pumps for all-year-round hot water supply and heating at children education institutions and healthcare institutions*	City's public institutions	Municipal Economy Department of Odessa City Council, Capital Construction Division of Odessa City Council, Agency of Odessa Development Programs	2013	2015	4 900 000	163 333	Municipal budget, Oblast budget	245 056	0	1 995	798

Completion of reconstruction of the treatment facilities of the municipal infectious hospital	City's public institutions	Municipal Economy Department of Odessa City Council, Capital Construction Division of Odessa City Council	2015	2016	4 200 000	140 000	Municipal budget	614 175	5 000	0	4 620
Capital renovation of Kindergarten No. 232 located at: 138 Prospekt Dobrovolskoho	City's public institutions	Capital Construction Division of Odessa City Council	2014	2015	3 600 000	120 000	Municipal budget	260 410	2 120	0	848
Capital renovation of Kindergarten No. 55 located at: 4 Bazarna Str.	City's public institutions	Capital Construction Division of Odessa City Council	2015	2016	2 800 000	93 333	Municipal budget	206 363	1 680	0	672
Reconstruction of Kindergarten No. 165 located at: 5/5 Akademika Vilyamsa Str.	City's public institutions	Capital Construction Division of Odessa City Council	2016	2016	2 890 000	96 333	Municipal budget	191 623	1 560	0	624
Capital renovation of the kindergarten located at: 12 Dyukivska Str.	City's public institutions	Capital Construction Division of Odessa City Council	2018	2019	3 100 000	103 333	Municipal budget	217 418	1 770	0	708
Reconstruction of the General Education School No. 19 located at: 3 Kustanayska Str., Building "A-2" (premises for pre-school groups)	City's public institutions	Capital Construction Division of Odessa City Council	2016	2017	1 570 000	52 333	Municipal budget	39 307	320	0	128
Capital renovation and opening of pre-school groups at Odessa Education Center No. 1 "Specialized School of Grades I-III – Pre-School Institution" located at: 17 Pl. Molodi	City's public institutions	Capital Construction Division of Odessa City Council	2016	2017	3 300 000	110 000	Municipal budget	41 764	340	0	136

Capital renovation of the Children and Youth Sport Schools Nos.1, 3, 4, 5, 6, 8; Children and Youth Sport School No.15, Children and Youth Sport School "Ginestra", Spartak Stadium	City's public institutions	Capital Construction Division of Odessa City Council	2017	2019	15850000	528333	Municipal budget	378943	2950	0	1180
Repair and renovation works at education institutions of Odessa	City's public institutions	Capital Construction Division of Odessa City Council	2016	2019	23 500 000	783 333	Municipal budget	675 593	5 500	0	2 200
Replacement of electric equipment at pre-school institutions and schools	City's public institutions	Department of Education and Science of Odessa City Council	2016	2019	42 000 000	1 400 000	Loans, Municipal budget	1 569 832	12 780	0	11 809
Replacement of electric equipment at healthcare institutions	City's public institutions	Department of Healthcare of Odessa City Council	2016	2019	73 502 000	2 450 067	Loans, Municipal budget	329 198	2 680	0	2 476
Installation of heat regulators at radiators at the institutions of education, healthcare, culture and social protection sectors	City's public institutions	Department of Education and Science of Odessa City Council, Department of Healthcare of Odessa City Council, Department of Culture and Tourism of Odessa City Council, Department of Labor and Social Policy of Odessa City Council, Capital Construction Division of Odessa City Council	2016	2018	16 100 000	536 667	Municipal budget, ESCO contracting, Energy Efficiency Fund	293 576	2 390	0	956
Arrangement of 100% metering at all public institutions of the City	City's public institutions	Agency of Odessa Development Programs , relevant departments	2016	2016	7 890 120	263 004	Municipal budget, ESCO contracting	122 835	1 000	0	280
Installation of individual heating units at the institutions of education, healthcare	City's public institutions	Capital Construction Division of Odessa City Council	2016	2017	30 000 000	1 000 000	Municipal budget, ESCO contracting	1 394 178	11 350	0	4 540

and culture sectors											
Repair and replacement of pipelines in the internal systems of district heating, hot water supply, cold water supply and sewerage	City's public institutions	Department of Education and Science of Odessa City Council, Department of Healthcare of Odessa City Council, Department of Culture and Tourism of Odessa City Council, Department of Labor and Social Policy of Odessa City Council	2016	2020	14 324 000	477 467	Municipal budget, ESCO contracting	135 119	1 100	0	440
Installation of reflectors behind radiators at all public institutions of the City	City's public institutions	Capital Construction Division of Odessa City Council, relevant departments	2016	2016	220 000	7 333	Municipal budget, ESCO contracting	282 521	2 300	0	920
Introduction of the system of energy management and daily monitoring of the consumption of energy resources by all public institutions in the City	City's public institutions	Agency of Odessa Development Programs , Odessa Municipal Energy Agency	2015	2016	780 000	26 000	Grants, Municipal budget	835 278	6 800	0	2 040
Restoration of the facades of historic buildings in the center of the City	Historic buildings	Capital Construction Division of Odessa City Council	2016	2020	28 000 000	933 333	State Budget, Municipal budget, residents' own funds	24 567	200	0	60
Restoration of the architectural landmarks of the national significance that are located in Odessa's historic center	Historic buildings	Capital Construction Division of Odessa City Council	2016	2020	34 000 000	1 133 333	State Budget, Municipal budget	24 567	200	0	60

Development and implementation of the Innovation Project "Zero Energy Structure"	Construction	Odessa National Academy of Food Technologies	2016	2020	7 500 000	250 000	Investment funds	285	0	0	2,14
Development and implementation of the Innovation Project "Photovoltaic Lighting of Buildings"	Institutions	Odessa National Academy of Food Technologies	2016	2020	15 000	500	Investment funds	132	0	1,1	1,01
Development and implementation of the design of the heat pump installation for hot water supply as part of the sewerage system at dormitories	Municipal energy	Odessa National Academy of Food Technologies	2016	2020	320 000	10 666	Investment funds	19,1	0	0	0,2
Total until 2020					528141120	17854702	0	19292795	153952	2973,1	75897,35
SERVICES											
Installation of individual heating units	Entrepreneurial entities	Business entities (services)	2016	2020	12000000	400000	Private investments	969 168	7 890	0	3156
Reconstruction of ventilation systems	Entrepreneurial entities	Business entities (services)	2016	2020	32 890 000	1 096 333	Loans	2 634 811	21 450	0	8580

Thermal renovation of the buildings using modern materials for heat insulation of the walls	Entrepreneurial entities	Business entities (services)	2014	2019	94 567 000	3 152 233	Private investment, loans, State support	8 339 270	67 890	0	13713,78
Optimization of working processes and reduction of the consumption through organizational measures	Entrepreneurial entities	Business entities (services)	2008	2020	218 000	7 267	Loans	442 206	3 600	0	727,2
Installation of solar panels for generation of electricity for own needs	Entrepreneurial entities	Business entities (services)	2017	2019	1 000 000	33 333	Private investments	67 559	0	550	508,2
Replacement of incandescent lamps with LED lamps	Entrepreneurial entities	Business entities (services)	2012	2020	785 000	26 167	Private investments	282 521	2 300	0	2125,2
Replacement of electric equipment	Entrepreneurial entities	Business entities (services)	2008	2020	41 270 000	1 375 667	Private investment, loans	9 158 580	74 560	0	68893,44
Total until 2020					182 730 000	6 091 000		21 894 115	177 690	550	97 704
RESIDENTIAL SECTOR											
Energy audits of residential buildings in municipal ownership	City's residential stock	ACMB, Municipal Economy Department of Odessa City Council	2013	2019	3 700 000	123 333	Municipal budget, residents' own funds, Energy Efficiency Fund	0	0	0	0
Reconstruction of the residential building at	Multi-family residential	Municipal Economy Department of Odessa	2013	2017	5000000	166666	Investment funds	448329	3650	0	1460

42 Akademika Sakharova Str. and its presentation as a showcase for reconstruction of similar buildings	buildings	City Council, NGO									
Installation of individual heating units at heat distribution stations of the buildings	Multi-family residential buildings	ACMB, Municipal Economy Department of Odessa City Council	2013	2020	156 789 000	5 226 300	Investment funds	15 210 000	123 825	0	49 530
Thermal renovation of residential buildings using modern materials for heat insulation of the walls	Multi-family residential buildings	ACMB, Municipal Economy Department of Odessa City Council	2013	2020	780 228 670	26 007 622	Municipal budget, residents' own funds, Energy Efficiency Fund	49 011 430	399 002	0	80 598
Connection of the multifunctional complex of alternative energy consumption: solar collectors and heat pumps at Associations of Co-Owners of Multi-Family Buildings	Multi-family residential buildings	ACMB, Municipal Economy Department of Odessa City Council	2013	2020	9 600 000	320 000	Investment funds	360 000	0	2 931	592
Establishment of the Public-Private Partnership. Energy efficiency and energy saving in the lift system in Odessa by the initiative of the Municipal Company "Agency of Development Programs" Examination of the existing lift equipment of Odessa, consulting by German experts on the measures for improvement of energy	Multi-family residential buildings	Department of Municipal Economy of Odessa City Council, Municipal Company "Agency of Development Programs"	2013	2015	4 000 000	133 333	Funds of Deutsche Gesellschaft fur Internationale Zusammenarbeit, investment funds	200 000	1 628	0	1 504

efficiency of the lifts, pilot modernization of lifts, development of the plans for reforming and financing of the lift equipment*											
Compensation of a part of credit funds received by ACMBs, HCCs, OCOHs and individuals for installation of metering equipment and regulation of the supply and consumption of energy supplied by CE "Teplopostachannia mista Odesy" (Odessa City Heating Company)	Multi-family residential buildings	ACMB, HCC	2015	2020	56 789 000	1 892 967	Municipal budget, Energy Efficiency Fund	8 900 000	72 455	0	28 982
Compensation of a part of credit funds received by ACMBs, HCCs, OCOHs and individuals for implementation of the measures for energy saving, reconstruction and modernization of residential buildings	Multi-family residential buildings, single-family buildings	ACMB, HCC, individual owners of residential premises	2015	2020	77 890 000	2 596 333	Municipal budget, Energy Efficiency Fund	11 000 000	89 551	0	18 089
Installation of metering equipment for cold and hot water in the residential stock	Multi-family residential buildings, single-family buildings	ACMB, HCC, individual owners of residential premises, service providers	2014	2016	7 560 000	252 000	Municipal budget, residents' own funds, Energy Efficiency Fund	1 899 030	15 460	0	3 123
Reconstruction of the heating systems in the residential stock	Multi-family residential buildings	ACMB, HCC, individual owners of residential premises	2014	2020	23 140 000	771 333	Municipal budget, residents' own funds, Energy Efficiency Fund	2 191 377	17 840	0	3 604

Heat insulation of doors, windows, staircases, installation of devices for automatic closing of the doors	Multi-family residential buildings	ACMB, HCC, individual owners of residential premises	2008	2020	5 460 000	182 000	Residents' own funds, investment funds	1 093 232	8 900	0	3 560
Establishment of the revolving fund for financing of energy efficiency measures in single-family buildings	Private housing stock	Deputy Mayor, Department of Economic Development of Odessa City Council, Odessa Municipal Energy Agency	2016	2020	500 000	16 667	Municipal budget, grants	124 678	1 015	95	224
Replacement of incandescent and luminescent lamps with LED lamps	Multi-family residential buildings, single-family buildings	ACMB, HCC, individual owners of residential premises	2012	2020	5 000 000	166 667	Residents' own funds	4 176 391	34 000	0	31 416
Installation of luminaires with time relays and motion sensors	Multi-family residential buildings	ACMB, HCC, individual owners of residential premises	2017	2020	2 350 000	78 333	Residents' own funds, investment funds	3 009 458	24 500	0	22 638
Heat insulation of the roofs of multi-family and single-family buildings	Multi-family residential buildings, single-family buildings	Housing owners	2008	2020	19 870 000	662 333	Residents' own funds, investment funds	15 845 719	129 000	0	26 058
Purchases of electric equipment of at least Class A of energy efficiency	Private housing	Housing owners	2008	2020	4 350 000	145 000	Residents' own funds	1 719 690	14 000	0	12 936
Installation of electric meters of higher accuracy levels	Private housing	Housing owners, service providers	2008	2020	1 000 000	33 333	Residents' own funds	1 924 825	15 670	0	14 479
Reduction of consumption of the natural gas due to its rational use	Private housing	ACMB, HCC, individual owners of residential premises	2014	2020	1 450 000	48 333	Residents' own funds	23 584 326	192 000	0	38 784

Flushing of the heating systems	Multi-family residential buildings, single-family buildings	ACMB, HCC, individual owners of residential premises	2012	2019	9 800 000	326 667	Residents' own funds, investment funds	1 594 399	12 980	0	5 192
Replacement of old gas boilers by individual consumers with the boilers of new generation	Private housing	Housing owners	2008	2020	26 500 000	883 333	Residents' own funds	6 838 226	55 670	0	11 245
Installation of the "smart building" systems	Single-family buildings	Housing owners	2017	2020	2 400 000	80 000	Residents' own funds	42 378	345	0	70
Replacement of gas boilers with alternative energy sources	Single-family buildings	Housing owners	2012	2020	1 000 000	33 333	Residents' own funds	0	0	7 600	1 535
Modernization of lifts using energy saving technologies	Multi-family residential buildings	Municipal Economy Department of Odessa City Council	2016	2020	190000	6333	Municipal budget	1340	11	0	10,2
Total until 2020					1204566670	40152219		149 174 828	1 211 502	10 626	355 629
STREET LIGHTING											
Capital renovation of street lighting and external power supply systems*	Street lighting system	Municipal Economy Department of Odessa City Council, Agency of Odessa Development Programs	2013	2015	10 335 000	344 500	Municipal budget, leasing	148 262	1 207	0	1 115
Capital renovation of street lighting networks	Street lighting system	Municipal Economy Department of Odessa City Council	2016	2020	150000000	5000000	Municipal budget	810	0,56	0	0
Replacement of lighting equipment with LED equipment in the central streets and squares of the City*	Street lighting system	Municipal Economy Department of Odessa City Council	2013	2015	7 300 000	243 333	Municipal budget	119 273	971	0	897

Installation of outside LED-traffic lights. Installation of 24 traffic light sets in the City's central streets*	Traffic lights system	Department of Transport, Communications and Traffic of Odessa City Council	2013	2015	5 000 000	166 667	Municipal budget	62 277	507	0	468
Installation of solar panels for generation of electricity for local consumption by the street lighting equipment	Street lighting system	Municipal Economy Department of Odessa City Council	2018	2020	4 500 000	150 000	Municipal budget, leasing	0	0	210	194
Installation of the systems of automatic control of the street lighting	Street lighting system	Municipal Economy Department of Odessa City Council	2017	2020	54 679 000	1 822 633	Municipal budget, leasing	402 653	3 278	0	3 029
Total until 2020					231 814 000	7 727 133		733 275	5964	210	5703
INDUSTRY											
Construction of the Marazliivska Substation (110 kW) - a closed-type substation with two 40 MWA transformers and two 110 kW cables lines for its connection*	Electricity networks	Business entity	2013	2015	342 143 037	11 404 768	Investment funds	39 307	320	0	296
Construction of the Chubayivka Substation (110 kW) - a 110/10 kW substation with two 40 MWA transformers and two 110 kW cables lines for its connection*	Electricity networks	Business entity	2013	2015	150 000	5 000	Investment funds	30 463	248	0	229
Reconstruction of the Yuvileyna Substation (35 kW). Transfer of the 35/6 kW substation for feeding from the 110 kW grid. Re-placement of the 1T and	Electricity networks	Business entity	2013	2015	75 000	2 500	Investment funds	32 000	261	0	241

2T transformers with 110/6 kW 2x40 MWA transformers, organization of four СШ-6 kW*											
Reconstruction of the Artyleriyska Substation (110 kW). Installation of two 40 MWA transformers, reconstruction of the closed distribution unit. Replacement of ВД-КЗ-110 with SF6 circuit breakers of 110 kW*	Electricity networks	Business entity	2013	2015	70 000	2 333	Investment funds	27 000	220	0	203
Reconstruction of the YuZR sub-station (110 kW). Replacement of ВД-КЗ-110 with SF6 circuit breakers of 110 kW, installation of two additional line cells of 110 kW. Construction of a detached chamber to the closed distribution unit*	Electricity networks	Business entity	2013	2015	68 000	2 267	Investment funds	28 000	228	0	211
Construction and reconstruction of electric networks of 0,4-10 kW. Construction and reconstruction of ПЛ-0,4-10 kW using self-holding insulated cables; installation of discharge stations*	Electricity networks	Business entity	2013	2015	31 200	1 040	Investment funds	10 000	81	0	75
Assembly and adjustment of the equipment for the automatic control system at water supply and sewerage pumping	Water supply and treatment system	Business entity	2013	2015	24 800 500	826 683	Investment funds	1 240 025	10 095	0	9 328

stations of Infox LLC: booster pump stations KHC-12A, KHC-13, booster pump station BHC Tairova, booster pump station Mulova and central pumping unit*											
Construction of the facility for disposal of biological and medical waste with generation of energy for the City's utilities	Construction	Department of Ecology and Development of Recreation Zones of Odessa City Council	2018	2019	15 000 000	500000	Investment funds	15104	0	118	31
Replacement of energy-consuming equipment and related infrastructure with efficient equipment at Sewerage Stations No. 6Б and No. 7A within the framework of the Project "City Infrastructure Development" as part of Part C of the Energy Savings Investment Project*	Water supply and treatment system	Business entity	2013	2015	58 086 000	1 936 200	Loan of the International Bank for Reconstruction and Development	4 504 800	36 674	0	33 886
Measures for development and modernization of gas networks*	Gas systems	Business entity	2013	2015	2 896 000	96 533	Investment funds	144 800	1 179	0	238
Reconstruction of gravity collectors on Devolanivsky Descent in the section from Yevreyska Str. to Mytna Ploscha	Water supply and treatment system	Business entity	2016	2018	8 700 000	290 000	Investment funds	147 402	1 200	0	1 109

Installation of distant metering units: gas distribution cabinets and gas regulation units	Gas systems	Business entity	2016	2018	2 500 000	83 333	Investment funds	560 988	4 567	0	923
Reconstruction of water supply and sewerage networks	Water supply and treatment system	Business entity	2016	2020	34 000 000	1 133 333	Investment funds	874 585	7 120	0	1 901
Installation of metering equipment in multi-family buildings	Water supply and treatment system	Business entity	2016	2016	4 700 000	156 667	Investment funds	261 639	2 130	0	569
Technical re-equipment of the chlorination stations, pump stations, aeration systems in aerating tanks	Water supply and treatment system	Business entity	2017	2018	4 500 000	150 000	Investment funds	939 688	7 650	0	7 069
Application of ISO: 50001 at the City's enterprises	Industrial enterprises	Business entity	2015	2020	2 103 000	70 100	Funds of companies	1 338 902	10 900	0	2 202
Installation of heat pumps at the City's sewer collectors and treatment facilities	Industrial enterprises	Business entity	2018	2020	12 340 000	411 333	Funds of companies	3 549 932	0	28 900	5 838
Reconstruction and renovation of enterprises using energy efficient equipment	Industrial enterprises	Business entity	2014	2020	457 900 000	15 263 333	Funds of companies	21 852 352	177 900	0	35 936
Replacement of electric equipment at industrial enterprises	Industrial enterprises	Business entity	2010	2020	367 890 100	12 263 003	Funds of companies	17 811 080	145 000	0	133 980
Modernization and optimization of production processes including that with the transition to renewable energy sources	Industrial enterprises	Business entity	2012	2020	789340000	26311333,33	Funds of companies	21729517,26	176900	13400	38440,6

Organization of activities of Odessa City Business Incubator for the purpose of dissemination of the positive practices of implementation of energy efficiency measures in the industry	Industrial enterprises	Business entity	2016	2020	10000	333,33	Funds of companies	0	0	0	0
Design and installation of heat regenerators for inter-sector use and heat-and-mass regenerators for food technologies	Industrial enterprises	Odessa National Academy of Food Technologies	2016	2020	400 000	13 333	Funds of companies	105	0	**0**	**1**
Design and installation of an energy efficient and environmentally safe grain dryer of the new generation	Processing	Odessa National Academy of Food Technologies	2016	2020	900 000	30 000	Investment funds	195	0	**0**	**1,47**
Total until 2020					2 113 602 837	70 953 426		75 137 884	582 673	42 418	272 708
TRANSPORT SECTOR											
Installation of reactance compensators at the tracking substations of the Municipal Company "Odessa Electric Transport"*	Electric transport	Municipal Company "Odessa Electric Transport"	2013	2015	900 000	30 000	Municipal budget	45 000	366	0	339
Replacement of the lighting systems of the rolling stock garages with LED lighting at the Municipal Company "Odessa Electric	Electric transport	Municipal Company "Odessa Electric Transport"	2013	2015	1 000 000	33 333	Municipal budget	50 000	407	0	376

Transport"*											
Modernization of the rolling stock with replacement of the contactor-rheostat system of control of torquey engines with the electronic system at the Municipal Company "Odessa Electric Transport"*	Electric transport	Municipal Company "Odessa Electric Transport"	2013	2015	30 000 000	1 000 000	Investment funds	3 000 000	24 423	0	22 567
Introduction of the light train sys-tem in Odessa	Electric transport	Department of Economic Development of Odessa City Council	2016	2020	160 000 000	5 333 333	State Budget, Municipal udget, leasing	954 428	7 770	0	1 935
Reconstruction of highways, viaducts, bridges, construction of two-level interchanges	Highways	Road Maintenance Department of Odessa City Council	2016	2020	356 700 000	11 890 000	Municipal budget	6 878 762	56 000	0	14 952
Development of the City's road infrastructure	Highways	Road Maintenance Department of Odessa City Council	2016	2020	130 000 000	4 333 333	Municipal budget	1 444 540	11 760	0	2 717
Beautification of internal drive-ways	Roads within neighborhoods	Road Maintenance Department of Odessa City Council	2016	2020	17 000 000	566 667	Municipal budget	257 954	2 100	0	523
Construction of bicycle lanes and parking lots	City territory	Division of Physical Culture and Sports of Odessa City Council	2015	2020	2 300 000	76 667	Municipal budget	393 072	3 200	0	854
Optimization and development of the municipal transport routes	Organizational solutions	Department of Transport, Communications and Traffic of Odessa City Council	2016	2017	120 000	4 000	Municipal budget	8 037 096	65 430	0	17 470
Introduction of the optimized traffic structure for all types of transport in Odessa	Organizational solutions	Department of Transport, Communications and Traffic of Odessa City Council	2016	2017	1 200 000	40 000	Municipal budget	8 339 270	67 890	0	16 905

Use of electric cars by the City residents	Private transport	City residents	2016	2020	29 000 000	966 667	Private investments	2 161 897	17 600	0	4 382
Replacement of the City's taxis with electric cars	Commercial transport	Business entity	2016	2020	68 000 000	2 266 667	Private investments	5 228 719	42 567	0	11 365
Procurement of new rolling stock (90 trolley buses; 20 trams)	Electric transport	Municipal Company "Odessa Electric Transport"	2016	2018	633 400 000	21 113 333	State Budget, Municipal budget, leasing	696 585	5 671	0	5 240
Modernization of tram cars with replacement of body (partial, lower floor) and the system of operation of traction engines	Electric transport	Municipal Company "Odessa Electric Transport"	2016	2018	57 000 000	1 900 000	State Budget, Municipal budget, leasing	92 532	753	0	696
Replacement of lighting equipment inside the vehicles with LED equipment	Electric transport	Municipal Company "Odessa Electric Transport"	2016	2020	292 300	9 743	Loans	8 906	73	0	67
Total until 2020					1 486 912 300	49 563 743		37 588 760	306 010	0	100 387
LOCAL HEAT GENERATION											
Reduction of internal losses of heat and water at PJSC Odessa TPP. Works on liquidation of the steam and water losses during outage periods*	Equipment	PJSC Odessa TPP	2013	2015	120000	4 000	Investment funds	6 000	49	0	20
Reduction of internal losses of heat and water at the turbine house of PJSC Odessa TPP*	Equipment	PJSC Odessa TPP	2013	2015	1261140	42 038	Investment funds	63 000	513	0	205

Reconstruction of the flow channel of the turbine generator at Station 3 of PJSC Odessa TPP*	Equipment	PJSC Odessa TPP	2013	2015	8698400	289 947	Investment funds	430 000	3 501	0	707
Replacement of the air heater of Boiler ТП-47, Station 10, at PJSC Odessa TPP*	Equipment	PJSC Odessa TPP	2013	2015	19395600	646 520	Investment funds	970 000	7 897	0	1 595
Construction of the boiler station with the capacity of 20 GCal/hour for the Luzanivka Neighborhood with heating networks*	Construction	Municipal Economy Department of Odessa City Council	2013	2015	20589000	686 300	Municipal, Oblast, State budget	250 000	2 035	0	814
Design and construction of new energy saving boiler stations at Odessa Municipal Heating Company*	Construction	Municipal Economy Department of Odessa City Council	2013	2015	1650000	55 000	Municipal budget, investment funds	82 500	672	0	269
Modernization of 5 boilers with the capacity of 0.4 to 1.6 GCal/hour with installation of spray and niche burners at Odessa Municipal Heating Company*	Equipment	Municipal Economy Department of Odessa City Council	2013	2015	622500	20 750	Municipal budget	31 100	253	0	51
Design of the scheme for development of Odessa's heating system	Strategy	Municipal Economy Department of Odessa City Council	2016	2018	20000000	701740	Municipal budget	36600	300	0	120
Optimization of working processes for reduction of consumption due to organization activities	Technological processes	Odessa Municipal Heating Company	2016	2020	5000000	175435	Investment funds	12290	100	0	40
Replacement of incandescent and luminescent lamps with LED and energy saving	Equipment	Odessa Municipal Heating Company	2016	2020	580000	20350	Investment funds	1586	13	0	12

lighting											
Replacement of electric equipment at the 8th Quarter Boiler Station	Equipment	Odessa Municipal Heating Company	2016	2017	1 200 000	42 104	Investment funds	976	8	0	7
Construction of the boiler station of 15 GCal/hour in Luzanivka Neighborhood and heating networks with individual heating units	Construction	Municipal Economy Department of Odessa City Council	2016	2018	76 310 915	2 677 520	City, Oblast, State Budget	250 000	2 035	0	814
Design and construction of new energy saving boiler stations at Odessa Municipal Heating Company	Construction	Municipal Economy Department of Odessa City Council	2016	2018	50 512 750	1 772 340	City budget, investment funds	82 500	672	0	269
Modernization of 5 boilers with the capacity of 0.4 to 1.6 GCal/hour with installation of spray and niche burners at Odessa Municipal Heating Company	Construction	Municipal Economy Department of Odessa City Council	2016	2017	8 923 703	313 106	Investment funds	163 000	1 327	0	1 226
Design and equipment of the electric drives of 5 network pumps at the district boiler station X-Quarter of Odessa Municipal Heating Company with frequency regulation devices according to the projects	Equipment	Odessa Municipal Heating Company	2016	2017	8 923 703	313 106	Investment funds	163 000	1 327	0	1 226
Reconstruction of heating networks in the sections: Sehedska Str. from ТК 2с 48 to ТК 2с56 2ш 529 mm L=1052 m,	Heating networks	Municipal Economy Department of Odessa City Council, Odessa Municipal Heating Company	2016	2018	468 965 219	16 454 574	Investment funds	1 588 260	12 930	0	5 172

Kanatna Str., L 925 m, Mechnykova Str. From ТК 2М05, Olgivska Str. To ТК2М07 Kovalevskoho Str. 2ш 700 mm L=358 m, Bazarna Str. from Remisnycha Str. ТК 2К29 to Kanatna Str., ТК 2К403 2ш 529 mm L=275 m, Vice-Admirala Zhukova Str from ТК 1018 to ТК 1024 2ш 377 mm L=300 m, Pastera Str. ТК 1003 – ТК 1010 2ш 530 L=495 m, ТК 1011 – ТК 1017 2ш 400 L=726 m, from Pivnichna-2 to Generala Bocharova Str. 2ш820 L=73 m, 2ш 630 mm L=998 m, Akademika Sakharova Str. from ТК 2041/3 Generala Bocharova Str. to ТК3012 Marselska Str. 2ш 529 mm L=2568 m, Generala Bocharova Str. from Prospekt Dobrovoskoho ТК 1032 to Dnipropetrovska Road ТК1032/5 2ш 426 mm L=750 m, Generala Bocharova Str. from Dnipropetrovska Road to ТК 2041/3 2ш 235 mm L=741 m,											

Itzhaka Rabina Str. (Generala Vyshnevskoho Str. ТК1106 – Borysa Derevyanka Square ТК1120) Ш426 - 1380 m, Varnenska Str. ТК 2201 to ТК 2205 (25 Chapayevskoi Dyvisii Str. – Generala Petrova Str.) ш 426 mm L=860 m, with the use of pre-insulated pipes Odessa Municipal Heating Company and installation of a new network Ду 300 mm at Heroiv Prykordonnykiv Str. – Krasnova Str., 2 Ш 325 mm – 205 m, 2 Ш 273 – 530 m, 2Ш219 – 40 m, the heating network from ТК 3013/13-1 (Krasnova Str.) to Central Facility at Lustdorfska Road 15 ш219/315 mm L=920 m											
Introduction of intelligent control system (ICS) at two of the four boilers at Chubaivka Boiler Station. Capacity of each boiler: 50 GCal/hour.	Equipment regulation	Odessa Municipal Heating Company	2016	2020	6 579 929	230 870	Investment funds	120 292	979	0	198
In accordance with the design, installation of	Equipment	Odessa Municipal Heating Company	2016	2018	16 989 482	596 110	Investment funds	146 000	1 189	0	1 098

frequency regulation devices for electric drives of the cold water intensifier pumps (design of equipment, installation and startup works) Odessa Municipal Heating Company											
Insulation of pipelines Odessa Municipal Heating Company	Heating networks	Municipal Economy Department of Odessa City Council	2016	2018	27 070 000	949 805	Municipal budget	2 303 500	18 753	0	7 501
Reconstruction of 7 boiler stations with replacement of 17 outdated coal boilers with modern efficient boilers with the capacity of 50 to 200 kW (6 Akademika Vorobyova Str., 175 Chornomorskoho Kozatstva Str., 9 Michurina Str., 41 Litakova Str., 6 Chornomorska Str., 109 Prospekt Svobody, 32 Khadzhybeyska Road)	Equipment	Municipal Economy Department of Odessa City Council	2016	2020	10 256 250	359 861	City, Oblast, State Budget	4700	512	0	108
Switching of 10 "small" boiler stations to the heating networks of Odessa CHP and the boiler station at Shampansky Lane (13, 15/17 Bohdana Khmelnytskoho Str., 34 Akademika Vorobyova Str., 6, 4a Yevreyska Str., 5 Zhukovskoho Str., 7 Remisnycha Str., 40 Mala Arnautska Str.,	Heating networks	Municipal Economy Department of Odessa City Council	2016	2017	6 168 500	244 636	Municipal budget	356	62	0	3 557

7 Panteleymonivska Str., Yuriya Oleshi Str., Dovzhenka Str.											
Maintenance works on testing the heating pipelines of the district heating system	Heating networks	Department of Municipal Economy of Odessa City Council	2017	2020	2500000	83333	Municipal budget	5320	1450	0	580
Design and equipment of the electric drives of 5 network pumps at the district boiler station X-Quarter with frequency regulation devices according to the projects Odessa Municipal Heating Company*	Equipment	Odessa Municipal Heating Company	2013	2015	3262780	108 759	Investment funds	163 000	1 327	0	1 226
Replacement of the shell-and-tube exchanger at 16 central heating units of Odessa Municipal Heating Company*	Equipment	Odessa Municipal Heating Company	2013	2015	4521600	150 720	Investment funds	226 000	1 840	0	372
Reconstruction of heating net-works at the sections at Segetska Str. - L1060 m, and Kanatna Str. - L925 m with installation of pre-insulated pipes at Odessa Municipal Heating Company*	Heating networks	Odessa Municipal Heating Company	2013	2015	15100340	503 345	Investment funds	1 588 260	12 930	0	5 172
Installation of the intelligent control system (ICS) on two of the four boilers of the Chubaivka Boiler Station (capacity of each boiler: 50 GCal/hour)*	Equipment regulation	Odessa Municipal Heating Company	2013	2015	2405824	80 194	Investment funds	120 292	979	0	198

Equipment of electric drives of the cold water pumps at central heating units with frequency regulation devices in accordance with the projects (design of equipment, assembly and com-missioning works) Odessa Municipal Heating Company*	Equipment	Odessa Municipal Heating Company	2013	2015	2921200	97 373	Investment funds	146 000	1 189	0	1 098
Heat insulation of pipelines at Odessa Municipal Heating Company*	Heating networks	Municipal Economy Department of Odessa City Council	2013	2015	27070000	902 333	Municipal budget	2 303 500	18 753	0	7 501
Construction of the modular boiler station (capacity: 6 MW) in the territory of Odessa National Academy of Construction and Architecture*	Construction	Odessa National Academy of Construction and Architecture	2013	2015	7500000	250 000	Funds of the educational institution	775 000	6 309	0	1 274
Total until 2020					825 098 835	28 772 169		12 033 032	99 904	0	42430
ORGANIZATIONAL AND LEGAL ACTIVITIES											
Holding of the Competition "Energy Efficient Odessa"*	Information activities	Agency of Odessa Development Programs, Odessa Municipal Energy Agency	2013	2015	30 000	1 000	Investment funds	0	0	0	0

Preparation and publication of the school diary with additional pages for energy saving information	Information activities	Agency of Odessa Development Programs, Odessa Municipal Energy Agency	2015	2017	180 000	6 000	Investment funds	0	0	0	0
Delivery of specialized training courses for heads of ACMB, managers of local self-government bodies and other stakeholders using the resources of Odessa National Academy of Construction and Architecture*	Information activities	Agency of Odessa Development Programs	2013	2015	90 000	3 000	Municipal budget	0	0	0	0
Awareness campaign in energy saving (publication of information materials, holding of conferences)	Information activities	Agency of Odessa Development Programs	2013	2018	400 000	13 333	Investment funds	0	0	0	0
Organization of activities of Odessa City Business Incubator based on the co-working principle	Construction	Department of Economic Development of Odessa City Council	2015	2017	300 000	10 000	Investment funds	0	0	0	0
Construction of a waste recycling plant in Odessa	Construction	Capital Construction Division of Odessa City Council	2017	2020	50 000 000	1 666 667	Investment funds	282 521	2 300	0	614
Development of Odessa Zoning Plan	Legal activities	Department of Architecture and Urban Development of Odessa City Council	2016	2018	3 500 000	116 667	Municipal budget	933 546	7 600	0	1 756
Design and performance of capital renovation of the Preobrazhensky Park located at: 27 Novoschipnyi Riad Str., Odessa	Construction	Capital Construction Division of Odessa City Council	2016	2018	12 340 000	411 333	Municipal budget	0	0	0	0

Ecological education and training	Information activities	Department of Ecology and Development of Recreation Zones of Odessa City Council	2016	2020	250 000	8 333	Donor funds	0	0	0	0
Professional training, retraining and improvement of qualifications	Training activities	Relevant departments	2016	2020	400 000	13 333	Funds of companies	0	0	0	0
Landscaping activities in Odessa	Construction	Department of Ecology and Development of Recreation Zones of Odessa City Council	2016	2020	7 800 000	260 000	Municipal budget	0	0	0	0
Establishment of monitoring groups of the pupils of Grades 9-11 to control consumption of heat, electricity and water at schools	Information activities	Agency of Odessa Development Programs, Department of Education and Science of Odessa City Council	2016	2020	240 000	8 000	Municipal budget, donor funds	0	0	0	0
Holding of Sustainable Energy weeks	Information activities	Agency of Odessa Development Programs	2016	2020	590 000	19 667	Municipal budget, donor funds	0	0	0	0
Local tax exemption of the part of income received due to implementation of energy saving pro-jects on condition of reinvestment into subsequent energy saving projects	Legal activities	Department of Economic Development of Odessa City Council	2017	2020	0	0	Municipal budget	6 141 752	50000	0	10 100
Specialized presentations and films in energy saving and eco-logical topics	Information activities	Agency of Odessa Development Programs	2016	2020	25 000	833	Municipal budget, donor funds	0	0	0	0

Surveys of residents or building maintenance staff where energy efficient measures are to be implemented	Information activities	Relevant departments depending on specific issues	2016	2020	25 000	833	Municipal budget	0	0	0	0
Keeping of specialized columns in local media	Information activities	Department of Information Support	2016	2020	130 000	4 333	Grants	0	0	0	0
Local tax exemption for the manufacturers of energy efficient and energy saving equipment	Legal activities	Members of Odessa City Council	2017	2020	0	0	Municipal budget	0	0	0	0
Creation of Associations of Co-Owners of Multi-Family Buildings	Information activities	Municipal Economy Department of Odessa City Council	2016	2020	500 000	16 667	Municipal budget	0	0	0	0
Construction of public transport stops with solar panels on roofs and LED lighting	Construction	Agency of Odessa Development Programs	2016	2016	200 000	6 667	Grants, Municipal budget	464	0	4	3
Introduction of the system of material incentives for collectives, individual employees and managers for efficient use and saving of energy resources	Legal activities	Department of Economic Development of Odessa City Council	2017	2017	2000000	66666	Municipal budget	55632	456	0	0
Development of business plans for investment projects in top-priority sectors that ensure ongoing activity and strategic development of the City	Legal activities	Agency of Odessa Development Programs	2016	2020	500000	16666	Municipal budget	0	0	0	0

Development of the set of intellectual computer simulators for energy management training	Training activities	Odessa National Academy of Food Technologies	2016	2020	480 000	16 000	Investment funds	0	0	**0**	**0**
Total until 2020					79 980 000	2665998		7 413 915	60 356	4	12473
The PLAN's total until 2020					5 941 974 642	217 689 390		282 081 695	2 266 409	56781	962932
For calculations the EUR/UAH exchange rate of 1/30 is used											

Consolidated table of technical measures by sectors

Sector	**Tentative cost as of the date of approval of the Plan (UAH)**	**Tentative cost as of the date of approval of the Plan (€)**	**Energy saving [toe]**	**Energy saving [MW]**	**Energy from renewable sources [MW]**	**CO_2 emission reduction [tons]**
Municipal buildings	528141120	17 854 702	19292795	153952	2973,1	75897,35
Services	182 730 000	6 091 000	21 894 115	177 690	550	97 704
Housing sector	1 204 566 670	40 152 219	149 174 828	1 211 502	10 626	355 629
Street lighting	231 814 000	7 727 133	733 275	5 964	210	5 703
Industry	2 113 602 837	70 953 426	75 137 884	582 673	42 418	272 708
Transport	1 486 912 300	49 563 743	37 588 761	306 010	0	100 388
Local heat generation	825 098 835	28 772 169	12 033 032	99 904	0	42 430
Organizational and legal activities	79 980 000	2 665 998	7 413 915	60 356	4	12 473

9. Expected results in 2020 and plans until 2030

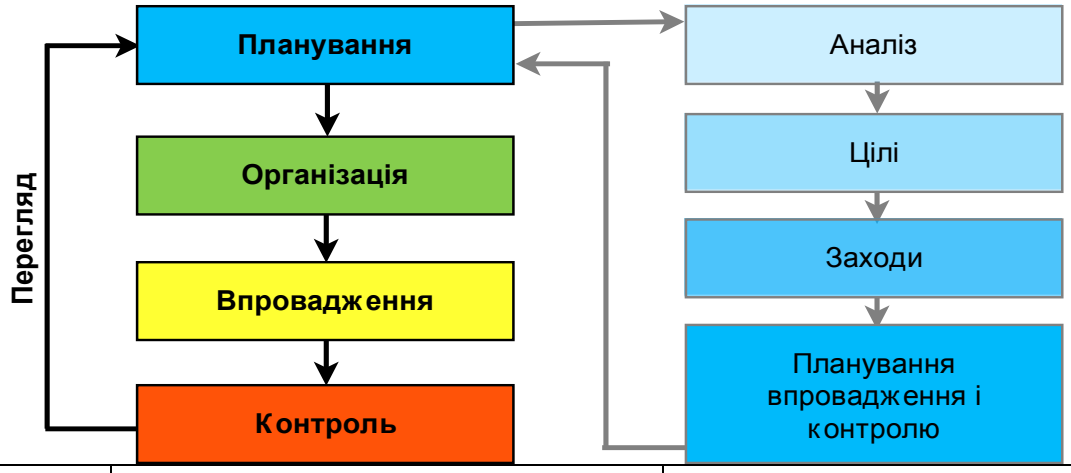
Based on the results of implementation of the technical and organizational measures presented in Section 6 of this document, it is planned to reduce until 2020 the consumption of energy resources in Odessa by 20.0%, decrease the greenhouse gas CO_2 emissions in the equivalent by 22.0%, and increase the share of energy from renewable sources by 20.0%, thus, achieving the goals and objectives undertaken by the City within the framework of the European initiative of Covenant of Mayors.

SEAP is an indicative document.
It may be revised, supplemented and adjusted depending on the changes of the circumstances that impact its implementation in accordance with the procedure set by legislation.

Based on the results of implementation of all measures and functions set in this document, considerable reduction of energy consumption is expected in the key sectors of the City's economy, such as, utilities, transport, housing stock, street lighting, etc. In addition, an important accomplishment will be the change of behavior of the City's population towards mindful attitude to energy resources and, consequently, to the nature in general.

Using the approaches of the complete management cycle the following mechanism will be applied for SEAP implementation. This mechanism has been used for the document's preparation and is recommended for its implementation as well.

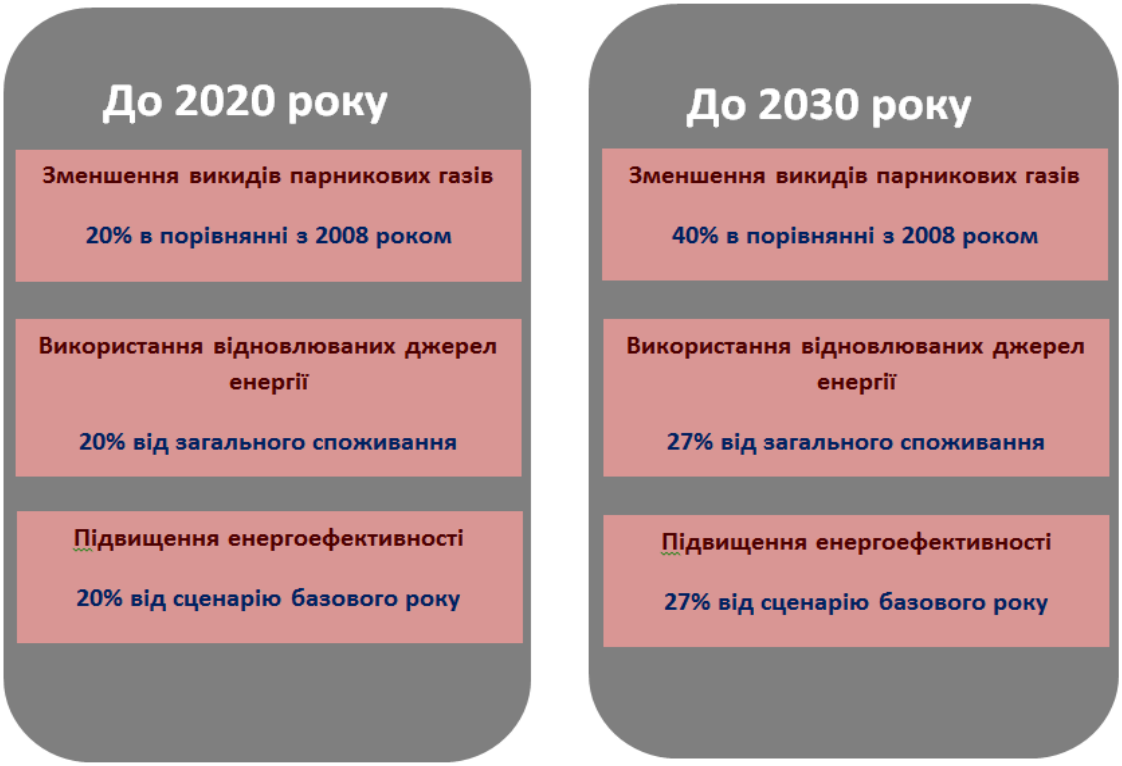
The scheme of the complete management cycle is shown in Graph 37.



Revision	Planning	Analysis
	Organization	Goals
	Implementation	Measures
	Control	Implementation and control planning

Graph 37. SEAP implementation mechanism.

The final general goals planned to be achieved in Odessa until 2020 and 2030 are presented in Graph 38.



Until 2020	Until 2030
Reduction of greenhouse gas emissions 20% in comparison with 2008	Reduction of greenhouse gas emissions 40% in comparison with 2008
Use of renewable energy sources 20% of total consumption	Use of renewable energy sources 27% of total consumption
Improvement of energy efficiency 20% in comparison with the baseline year scenario	Improvement of energy efficiency 27% in comparison with the baseline year scenario

Graph 38. General goals of Odessa until 2020 and 2030.

General administration of the implementation process, interim monitoring reports and the final report are assigned to Odessa Municipal Energy Agency. Ongoing efforts and resources should be utilized to disseminate information on the obligations undertaken by the City within the framework of the Covenant of Mayors, as well as the ways to achieve the goals and results. The City residents have to become active participants of the process rather than outside observers.

Reduction of CO2 emissions in Odessa until 2030

10. Focus-Group Methodology in the course of preparation of the Sustainable Energy Action Plan of Odessa until 2030

Goal: Expert opinion survey on the areas and prospects of development of Odessa with the aim of compliance with the obligations set under the European initiative of the Covenant of Mayors, particularly:

• to exceed the goals set by EU until 2020 by reducing CO_2 emissions in relevant territories by at least 20%;

• to submit the Sustainable Energy Action Plan within one year of the signature date including the baseline emission inventory with the outline of how the goals will be achieved;

• in cooperation with the European Commission and other interested parties, to organize Energy Days or Covenant Days, which will enable the residents to benefit directly from the possibilities and advantages due to the mindful use of energy, as well as to inform local media on a regular basis of the developments connected with the Action Plan.

Objectives: Survey of the expert opinion on the energy efficiency potential in Odessa for the purposes of fulfillment of the obligations undertaken by the City within the framework of the Covenant of Mayors.

Regulatory and legal framework:

- Resolution of Odessa City Council of 10 June 2015 No. 6702-VI "On Accession to the European Initiative of Covenant of Mayors";
- Order of the City Mayor of 7 August 2015 No. 741 "On Measures for Development of the Sustainable Energy action Plan of Odessa and Implementation of the System of Energy Management as Part of the Executive Bodies, Communal Companies and Institutions of Odessa City Council".

Sectors, for which focus groups will be held:

- Residential Buildings;
- Municipal Infrastructure and Street Lighting;
- Municipal Buildings;
- Industry;
- Transport.

Focus-group methodology:

- The participants of the focus groups will receive invitations indicating the key issues within a relevant sector to be discussed;
- Part One: familiarization of the participants with the goal and structure of Odessa's SEAP – general presentation, the same for all focus groups;
- Part Two: overview of the proposed measures within the framework of SEAP with the focus on the individual sector;

- Part Three: discussion with the task of the moderator to differentiate and fix possible measures for each sector with subsequent analysis and group discussion of each proposed variant;
- Standard methods for adult training will be applied: brainstorming, detailed review of proposals with subsequent summary, clustering into individual group discussions, etc.;
- Video and audio recording will be made throughout the entire focus group discussions.

Venue: 1 Dumska Pl., Odessa, Odessa City Council, Session Hall No. 307.
Focus-Group Coordinator: Agency of Odessa Development Programs, Contact Person: Yu. Kirvas, Manager for Support Activities in the Finance Sector.
Focus-Group Moderator: O. Shumelda, Director of the Sustainable Energy Development Agency, GIZ Consultant.

Secretary of the City Council O. Potapskyi