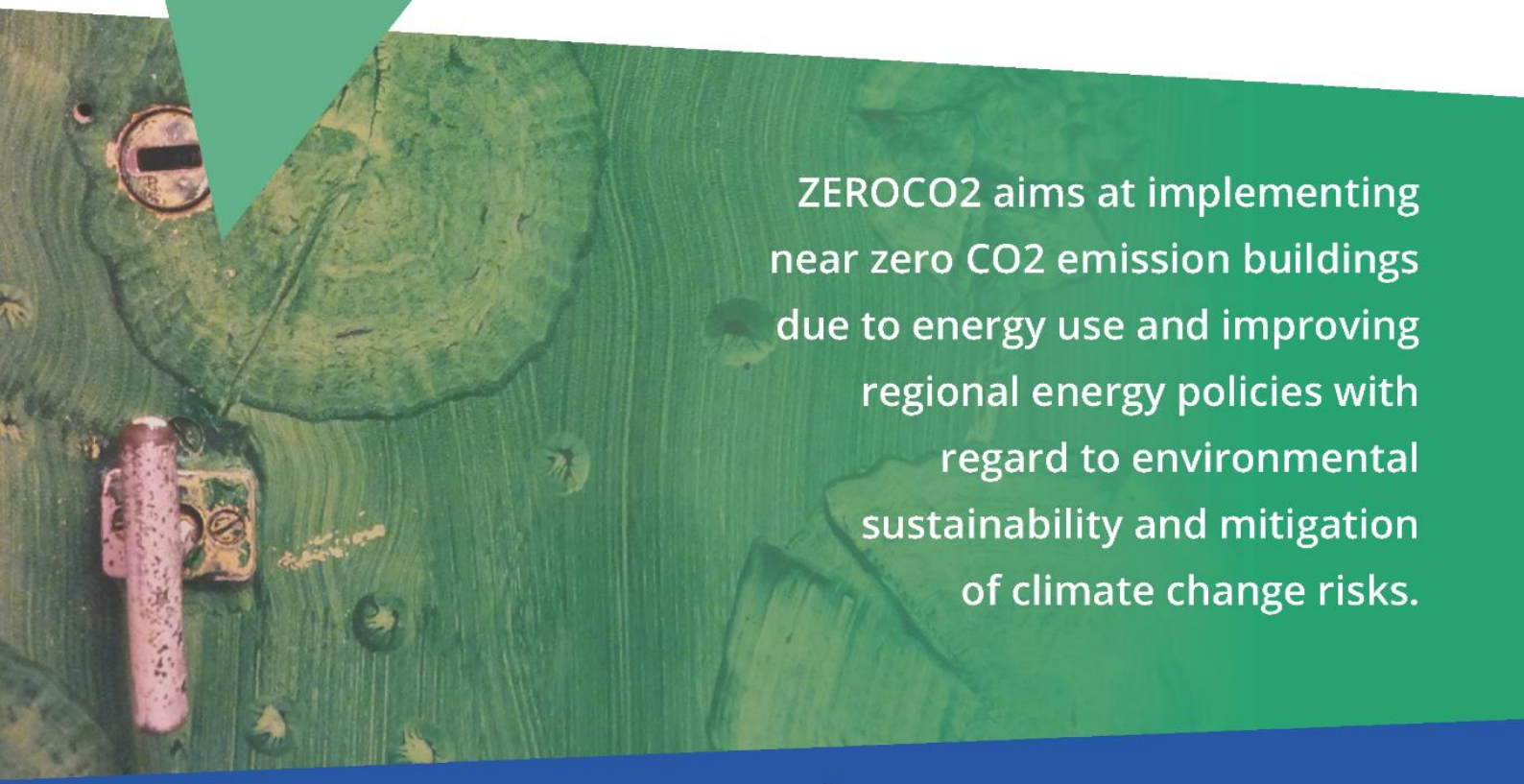
ZEROCO2

Interreg Europe



ZEROCO2 aims at implementing near zero CO2 emission buildings due to energy use and improving regional energy policies with regard to environmental sustainability and mitigation of climate change risks.

www.interregeurope.eu/zeroco2

An interregional cooperation project for improving low-carbon economy policies

Project Partners

European Institute for Innovation (DE)
Mediterranean Agronomic Institute of Chania (EL)
Thermopolis Ltd. (FI)
A.VI.TE.M – Agency For Sustainable Mediterranean Cities and Territories (FR)
Molise Region (IT)
Municipality of Kaunas District (LT)
Local Councils' Association (MT)
University of Malta (MT)
Local Energy Agency Spodnje Podravje (SI)

Low-carbon economy

€ 1.23 M ERDF

Apr 2016 Mar 2020

European Union
European Regional Development Fund

Promotion of near zero CO2 emission buildings due to energy use

ACTION PLAN

Municipality of Kaunas District –

Strategic Development Plan of Municipality of Kaunas District for Year 2013 - 2020

TABLE OF CONTENT

1. INTRODUCTION

The aim of the project is to improve regional energy policies with regard to environmental sustainability and mitigation of climate change risk, with a special focus on greening the building sector through enhancement of various eco-friendly energy sources and technologies, stressing its importance as an incubator for new markets in the field of energy, technologies, services and business models.

The project represents and implements NEAR ZERO CO2 EMISSION BUILDINGS DUE TO ENERGY USE in policies addressed at the same level as had been done for NEAR ZERO ENERGY BUILDINGS, which means that the buildings do not produce CO2 emissions due their use. EU, national and regional policies do not define near zero CO2 buildings due to energy use.

Municipality of Kaunas District

The Lithuanian partner, Kaunas District, addresses the Strategic Development plan of Municipality of Kaunas District for Year 2013 - 2020.

Kaunas district municipality is situated in the southern part of Lithuanian central lowland. Kaunas district surrounds the second largest city in Lithuania – Kaunas and covers 1496 km2, what makes 2,29 % of the Republic of Lithuania. It is one of 60 municipalities in Lithuania. Kaunas district municipality is subdivided into 25 elderships comprised of 371 villages, 9 small towns and 3 bigger towns.

In Kaunas district biofuel and natural gas are the most used sources of energy. Private houses are usually heated by their own biofuel boilers. Most of natural gas in district is consumed by industrial enterprises, utilities, household consumers as well as residents.

2. REGIONAL ANALYSIS

2.1 Presentation of the Kaunas District

Name of the region	Kaunas district municipality
Country	Lithuania
Area	1496 km^2
Population	
- **Number**	89 516 (2016)
- **Density**	60 people per km^2 (2016)

Social and geographical overview

Kaunas district municipality is situated in the southern part of Lithuanian central lowland. Kaunas district surrounds the second largest city in Lithuania – Kaunas and covers 1496 km2, what makes 2.29% of the Republic of Lithuania. It is one of 60 municipalities in Lithuania (see image 1). Kaunas district municipality is subdivided into 25 elderships comprised of 371 village, 9 small towns and 3 bigger towns (see image 2).

Image 1. Administrative map of the Republic of Lithuania

Image 2. Administrative map of Kaunas district municipality

Kaunas district municipality is one the most densely populated municipalities in Lithuania. The average population density is 60 people/km2, which is higher than the average in Lithuania (44 people/km2). Kaunas district municipality has annual population growth (diagram 1). According to statistics, population of municipality at the beginning of 2016 was 89 516, however, actual population is over 95 000. People up to 30 years old make 36.55% of all population in Kaunas district (diagram 2).

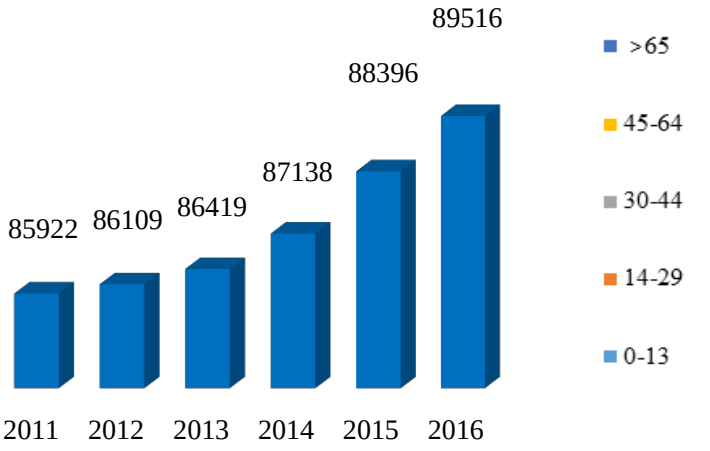


Diagram 1. Population growth in Kaunas district

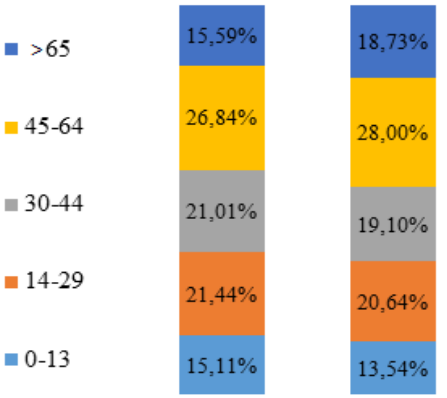


Diagram 2. Population age structure

Urban areas take up a great deal of land. According to statistics of issued building permits, Kaunas district is second after the capital city Vilnius. People are moving to live in areas outside the city, which are not far from the center, have good transport connection and infrastructure. Due to these reasons suburban settlements system emerges.

The average absolute altitude of Kaunas district is 60–70 meters above sea level. The highest point is 112 m above sea level. Water takes around 5% of the area. Rivers and ponds comprise the major part of the hydrographic network of the district. The biggest rivers are Nemunas, Neris, Nevėžis, Dubysa. There are almost any natural lakes in Kaunas district. Artificial bodies of water such as Kaunas Lagoon, ponds of Krivėnai, Pajiesys, Janušoniai, Išlaužas take the largest part of hydrographic network. There are a few swamps, most of them were drained. Bigger raised bogs in Ežerėlis and Novaraistis were drained for exploitation of peat.

Kaunas district municipality is situated between two large areas of forest. Forests cover around 30% of the district and it is an average Lithuanian forest coverage. The most forested parts of the district are in the west, in the northern part and in the south-east (image 3).

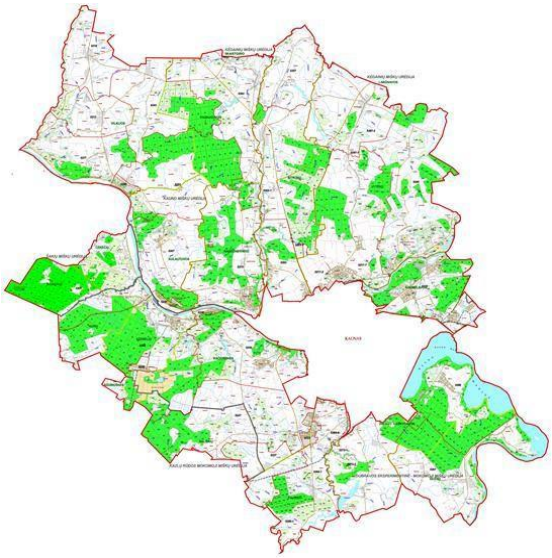


Image 3. Forest coverage in Kaunas district

Kaunas district is one of the most agricultural areas in the country because 90% of land consists of agricultural forestry and aquaculture land plots.

According to Lithuania's climatic sub-regions, Kaunas district falls into the category of the mid-lowlands of the Lower Nemunas climatic sub-region. The weather here is close to the average for the country. The average rainfall in Kaunas district is 630 mm per year (image 4).

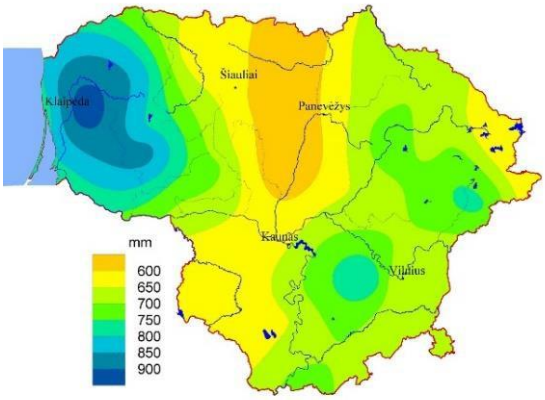


Image 4. The average annual rainfall in Lithuania per year

2.2 Use of energy in Kaunas district

	2009	2014
Natural gas	25.1	29.4
Oil products	28.7	35.9
Coal	1.8	2.8
Electricity	0	9.3
Other local sources	2.6	4.4
RES	12.1	23.9
Nuclear	29.7	0

Table 1. Change in energy supplies in Lithuania (%)

Changes in energy supplies in Lithuania has been observed. Significant changes have been noticed in the use of RES. In 2009 it made 12.1%, while 5 years later, in 2014, use of RES increased almost by half. 55% of heat in the country is provided by district heating system, while

45% by individual heating supply. Biomass currently constitutes 60% of district heating in Lithuania. Recently radical shift from natural gas has been observed.

In Kaunas district biofuel and natural gas are the most used sources of energy. Private houses are usually heated by their own biofuel boilers. Most of natural gas in district is consumed by industrial enterprises, utilities, household consumers as well as residents.

Centralized supply of heat in Kaunas district municipality is provided by “Kauno energija”, “Roalsa” and “Komunalinių paslaugų centras”. Heat is generated from natural gas, peat, biofuel, biogas. Heat sources usually are located in the settlements near Kaunas and are serving their customers. The main heat sources in Kaunas district are Kaunas power plant, Petrašiūnai power plant, “Šilkas” boiler house (BH), “Pergalė” BH, Garliava BH, Noreikiškės BH, Raudondvaris BH, Neveronys BH, Domeikava BH, Girionys BH, Ežerėlis BH. In 1998– 2002 decentralization in heating systems for Bubiai, Neveronys, Pagynė, Panevėžiukas, Mastaičiai, Rinkūnai, Šakiai, Vaišvydava, Žiegždriai and Sitkūnai villages and reconstruction of heating systems in Babtai, Karmėlava, Vandžiogala towns were carried out. Last year boiler rooms in 7 schools were renovated. All these actions enabled liquidation of uneconomical, morally and physically obsolete districts’ heating systems and fostered the use of RES.

In order to reduce consumption of energy and increase energy efficiency Multifamily buildings renovation (modernization) programme is being actively implemented. Under this programme the State and local municipalities are committed to support the renovation of multifamily buildings. The goal of this programme is to reduce the thermal energy (fuel) costs in multifamily buildings not less than 230 000 tons per year by the end of 2020. It is planned to save 5700 MWh of thermal energy in Kaunas district in 2020. The first projects related to buildings renovation began in 2008 when municipality received financial support from the European Union funds. Until that due to limited municipal budget only small repair works could be carried out. Renovation of buildings (insulation of walls, roof and floor, replacement of old windows and doors as well as other measures) usually reduces the energy consumption for heating by 24– 55%. Renovation of private residential houses depends on the initiative of owners. They replace old windows and doors with new ones, insulate walls and other partitions. It is expected that these measures will help to save about 7360 MWh of thermal energy (about 15% of current consumption) in 2020. Private houses are usually heated by their own biofuel boilers (about 78%) or natural gas (about 22%). In

2020 it is planned to save about 4860 MWh of thermal energy for which production natural gas is used and about 2500 MWh – for biofuels.

2.3 Renewable energy sources

According to Directive of the European Parliament and of the Council No 2009/28/EC on the promotion of the use of energy from renewable sources, Lithuania has undertaken to increase the RES share in the final national energy consumption up to 23% by 2020. This target was reached already in 2014. The share of RES in the total energy balance of the country exceeded one fifth, accounting for 23.86%.

	2013	2014
RES in heating and cooling	37.7	41.6
RES in electricity production	13.1	13.7
RES in transport	4.6	4.2
Overall share of RES	22.9	23.9

Table 2. Share of RES in energy supplies in Lithuania (%)

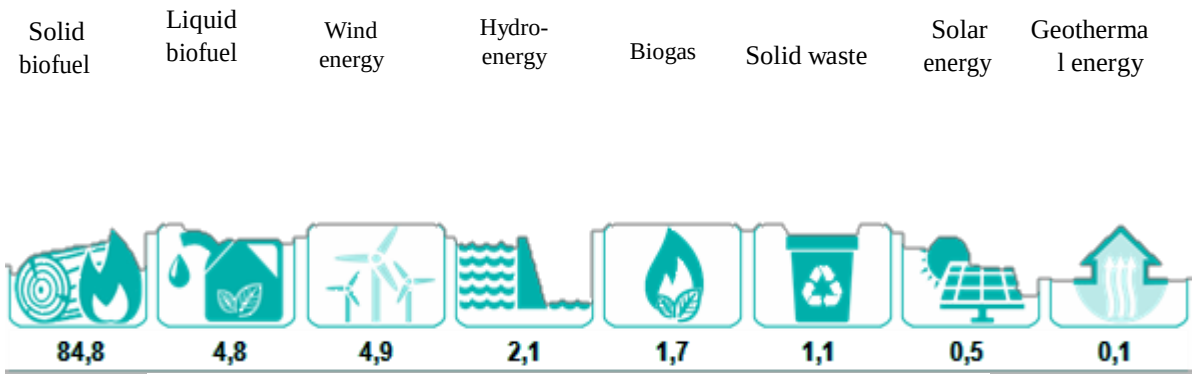


Image 5. Structure of use of RES in Lithuania in 2015 (%)

Currently the main domestic energy resource in Lithuania is solid biomass. It has the greatest potential among all renewable energy sources. In 2015 the major part of biofuel was used for production of electricity and centralized heating (48.4%) as well as residential sector (40.8%). Hydropower for a long time has been one of the main renewable energy sources in electricity production in Lithuania, however situation has changed a lot. In recent years, wind power and biofuels for electricity production has increased. Currently in Lithuania almost one quarter of all electricity is produced from wind energy. More and more wind turbines are built every year. In 2015, wind power plants produced over 810 GWh of electricity. This made 16.4% of all electricity produced in Lithuania. Hydropower plants produced about 350 GWh of electricity, while solar plants – 73 GWh.

As of May 2016, in Lithuania there are 2435 power plants having permission to produce electricity from RES. Total power of all these power plants is 674.442 MW out of which:

- 2145 solar power plants (71.521 MW);
- 146 wind power plants (387.431 MW);
- 10 solid biomass power plants (54.96 MW);
- 36 biogas power plants (32.671 MW);
- 98 hydropower plants (127.859 MW).

Kaunas district has some experience installing renewable energy technologies in public and business facilities. However, there has been a lack of planning and coordination of renewable energy, so it has developed rather spontaneously, separate initiatives from state, scientific and business level have emerged. At the moment in total in Kaunas district there are 135 plants out of which:

- 113 solar power plants
- 5 biogas power plants
- 15 biomass boiler houses
- 2 hydropower plants

Use of energy in Kaunas district (2012)

Energy source	Region GWh	Building sector GWh	Residential GWh	Non-residential GWh	Commercial GWh
Natural gas	100.13	100.13	32.4	4.15	63.58
Liquefied gas	2.52	2.52	-	2.52	-
Coal	3.22	3.22	-	3.22	-
Biofuel	114.79	114.79	114.79	-	-

2.4 Use of renewable sources in building

RES	Lithuania %
Wind power	4.9
Wood biomass	84.8
Hydro power	2.1
Solar energy	0.5

2.5 CO2 emissions in Kaunas district

	CO_2 emission in ton/year				
Source	Region	Building sector	Residential	Non-residential	Commercial
Natural gas	20525	20525	6646	846	13033
Liquefied gas	594	594	-	594	-
Coal	1101	1101	-	1101	-

2.6 Potential of using RES in Kaunas District

Solar energy

Compared to global trends Lithuania does not use solar energy vastly, however, interest in solar energy is constantly growing. It is often believed that solar thermal technologies or PV cannot operate efficiently due to lack of intensive solar radiation. The geographical latitude of Lithuania is not that favorable to the use of solar energy as in those countries which are closer to the equator. However, solar radiation data suggest that situation in Lithuania in this respect is not much worse than in neighbour countries.

The largest volumes of solar energy are in the south-west region of Lithuania, which provides the highest potential. Climatic conditions play a major role for the intensity of

solar energy. Meteorological observations show that the duration of sunshine depends on the distance from the sea mainly and differs by 250 hours, even the distance from the coast to the eastern border is not more than 350 km. Most of sunny hours per year are in Nida (1900 h per year), while the least – in the eastern part of the country (1650 h per year). In Kaunas district duration of sunshine per year is about 1750 h (image 6).

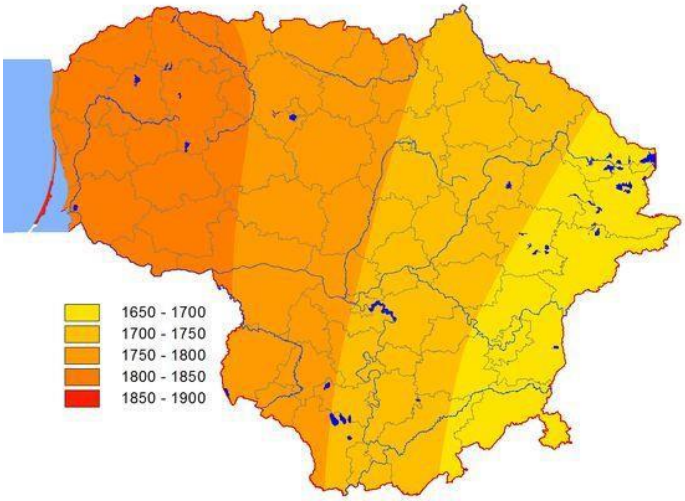


Image 6. Duration of sunshine in Lithuania (hours per year)

Annual solar radiation on the horizontal surface in Lithuania is slightly more than 1000 kWh/m2. The major part of solar energy resources are in the West by the sea. Maximum annual solar radiation on a horizontal surface is in Nida – 1042 kWh/m2. Meanwhile, the minor part of this kind of resources is in the Northeast and East. Minimal annual solar radiation on a horizontal surface is in Biržai – 926 kWh/m2. Average yearly solar radiation on the horizontal surface in Kaunas district is close to average of Lithuania.

	Annual solar radiation per year (kWh/m^2)	**Viability**
Klaipėda, Telšiai, Nida	1015 – 1042	High
Utena, Kaunas, Šiauliai	946 – 996	Average
Biržai, Varėna, Vilnius	926 – 939	Low

Table 3. Average annual solar radiation on the horizontal surface per year in different parts of Lithuania

Monthly distribution of total solar radiation in Kaunas district shows a very big difference between summer and winter seasons as Lithuania is rather far to the North. The largest part (87.6% or 910 kWh/m2) of the yearly solar energy comes in March–September, so one of the options could be installation of seasonal solar heating systems. Approximately only 190 kWh/m2 of solar radiation comes in winter season. Thus the volume of solar energy available during cold winter period in practice could be used as the source of supplementary heat for existing heating system. In reality this solar energy could be used in solar collectors for water heating or premises heating needs via solar space heating systems.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Per year
Sun exposure (kWh/m^2)	16	33	70	99	146	155	150	138	90	52	16	19	976
Sun luminosity time, h	40	68	128	175	251	265	256	238	160	99	41	30	1751

Table 4. Average annual sun exposure and luminosity time on a horizontal surface in Kaunas district

Solar energy potential in Kaunas district compared to Lithuania is close to average. Lately there has been noticed greater business and private investments in use of solar energy. However, solar plants built in Lithuania so far are relatively small. It would be appropriate to install such plants on public buildings (schools, kindergartens, hospitals, etc.). In the near future Kaunas district municipality is planning to install PV solar panels on the roofs of 3 schools in Garliava, Raudondvaris and Domeikava towns as well as Culture and Sports center in Garliava. This kind of investment would not only help to reduce CO2 emissions, but it could also have a significant educational impact on further development of solar energy sector.

Wind power

Lithuania lags behind other European countries, when it comes to wind generation capacity development, however it is well prepared and has all the tools for future growth of renewable energy. Wind energy potential in Kaunas district is lower than in the coastal zone. The average wind speed in Kaunas district is close to 5.0 m/s (image 7). It is not very favourable to electricity generation from wind, however, it is possible to build wind turbines. Due to

urbanized areas and lack of space, wind energy development in Kaunas district is rather limited.

There is a claim and the opportunity to build a small, up to 250 kW wind turbines. Construction of wind turbines is more effective in western part of Lithuania due to faster wind speed. Wind turbines are considered to be effective when average wind speed is at least 5–6 m/s.

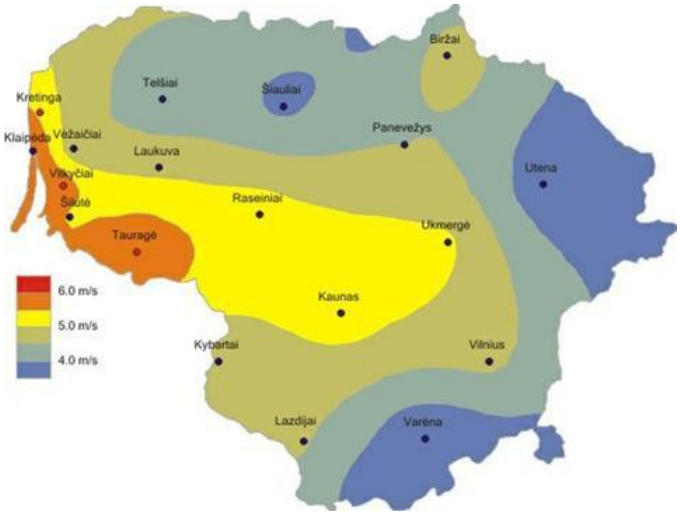


Image 7. Average annual wind speed in Lithuania (m/

Hydropower

Located in the zone of excessive humidity, Lithuania has a dense river network (image 8). Average density is almost 1 km/km². In total there are around 30 thousand rivers and streams. The total length of all these watercourses is around 64000 km, however only less than 20 rivers in Lithuania are longer than 100 km.

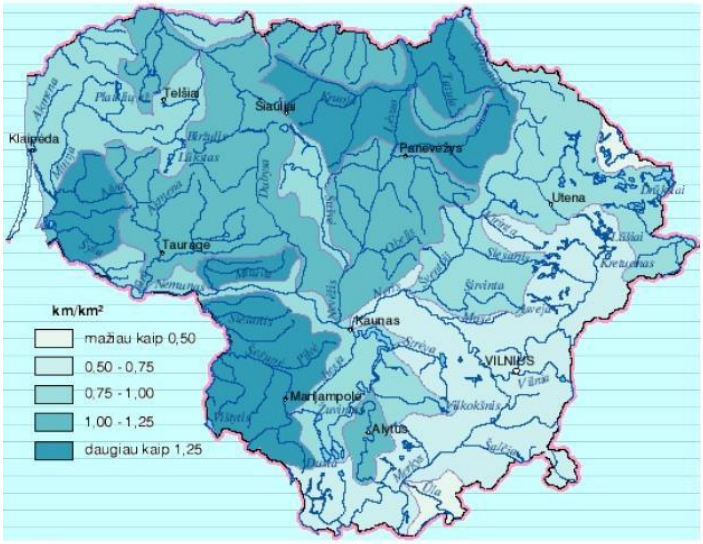


Image 8. Average density of Lithuanian river network (km/km^2)

All Lithuanian rivers drain into the Baltic Sea – mostly (72%) via the Nemunas river. Rivers discharges 35-60% of the annual flow in spring. Rivers of Lithuania are typical lowland rivers: they are slow, they make meanders, the valleys are wide. The rivers are not evenly distributed. The highest density is in the western Lithuania part where it rains more often and in the northern part, where the soil has clay and it does not allow the water to drain underground. The lowest density is in the southeastern Lithuania, where the soil has a lot sand and the rainwater quickly ooze into the underground.

In Kaunas district density of river network is close to average. In general water takes around 5% of the area. There are no lakes, but district is rich in rivers, streams and dams. The largest body of water is Kaunas Lagoon (6350 ha). The biggest rivers are Nemunas, Neris, Nevėžis, Dubysa.

Kaunas Hydroelectric Power Plant (the KHPP) is the largest power plant in Lithuania using renewable resources. Annual production currently meets 4% of

total energy consumed in Lithuania. The KHPP capacity – 100.8 MW, 4 units of 25.2 MW. Despite the small capacity, the KHPP ensures the stability of the Lithuanian energy system. In order to increase the use of hydropower, more attention should be paid for rebuilding and restoring old hydroelectric stations (watermills) all over the country as nowadays old water mills and plants lie in ruins (there are about 200 of them), obstructing the rational use of rivers and streams. Due to limiting legal regulations, stakeholders have for decades not been able to acquire permits to fully rebuild or reconstruct hydroelectric stations on the rivers. There is no particular discussion about the role of small hydropower in grid development or its role in energy storage to cover intermittent renewable energy sources. However, possibilities for the use of the country's hydro resources should be assessed for the purposes of ensuring energy balance and a sufficient energy reserve. In this context, it is crucial that simplified conditions are established for rebuilding former hydroelectric stations, which have long proved their viability in many respects.

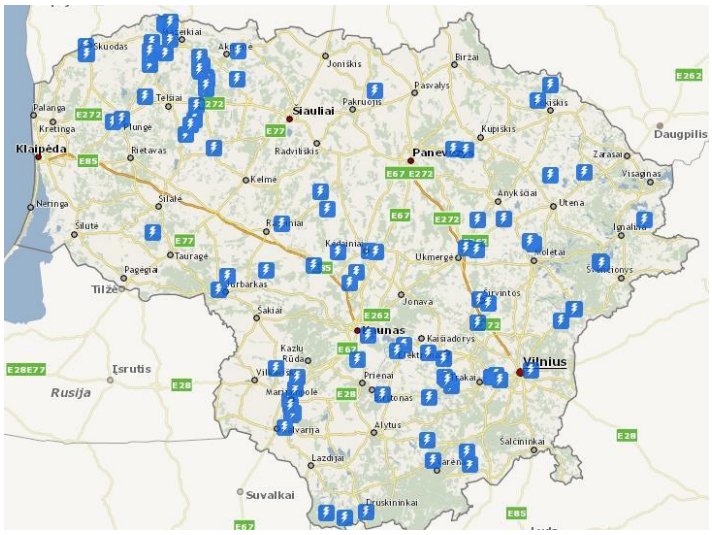


Image 9. Small-scale hydropower plants in Lithuania

The potential of Lithuania's hydropower development is evaluated favorably by scientists. However, hydropower is now encountering host of problems related to the lack of conformity between Lithuanian and EU legislation as well as to national environmental policy. Today, the potential of hydropower for the production of electricity is constrained by environmental limitations: the rivers that have the

greatest hydropower potential are listed as ecologically and culturally significant and the national Law on Water prohibits the construction of dams in their waters. More lenient environmental requirements would allow an increase of 30 MW for hydroelectric stations, and the development of such stations would be purposeful because hydropower is one of the cheapest renewable resources.

Geothermal energy

The aquifers defined in the sedimentary cover are potential sources for geothermal energy in Lithuania. They are conventionally grouped into several hydro-geothermal complexes. The heat capacity of different layers is also highly variable owing to the different reservoir properties, thickness, and temperature.

Heat flow intensity in Western Lithuania (80-90 mW/m2) is twice as high as that in

Eastern Lithuania (40-50 mW/m2). Western part of the country contains the largest resources of geothermal energy and is very perspective in geothermal energy exploitation (image 10). Heat flow in Kaunas district is ~ 50 mW/m2.

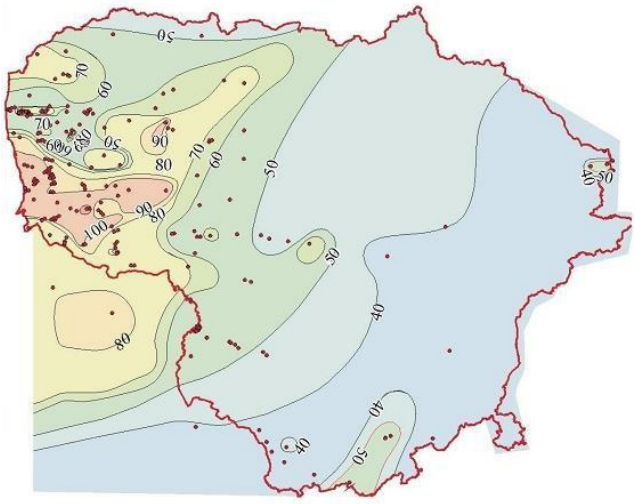


Image 10. Geothermal heat flow in Lithuania (mW/m^2)

Lithuania has no volcanic activity and no hot springs, but has many reservoirs with warm geothermal water which can be used for district heating, in health resorts and in swimming pools. Many different types of underground water have been found: drinking quality, mineral, mineralized and much mineralized.

Biomass

Biomass is fuel that is developed from organic materials, a renewable and sustainable source of energy used to create electricity or other forms of power. Quite a significant share of biofuels could be made from traditional agriculture unused meadows and pastures, which remains unused large quantities of herbaceous biomass every year. Technical potential of biomass is determined by disposable land where grain cultures are grown (straw as a waste product), energy crops (fast growing shrub, rape, corn, etc.), forests (firewood, timber, harvesting waste) and the productivity of the land, plant rotation time. Unused land may also supply RES (herbaceous biomass). Among these RES potential there is a correlation: in case of one plant expansion in the area, there is a decline of other plant production plots, and thus the corresponding RES potential.

Forests cover around 29.7% (44518 ha) of total area of Kaunas district.

Cutting waste	Firewood	Pulpwood	Fiberboard
22.7	51	22.9	15.8

Table 5. Kaunas district forest biomass potential (m^3)

Biomass energy resources can be supplemented with straw, which can be burned directly in boilers or used for the production of biofuels (pellets and briquettes). Information about the potential of straw in Lithuania is not collected, so it has to be established in accordance with sown area and grain yield.

Oilseed rape	Rye	Wheat	Barley	Oat	Total
11.65	6.24	105.91	49.17	3.92	176.88

Table 6. Annual straw production volumes (Kt)

The biggest straw potential is in wheat and barley straw. Other types of grain potential is low and their collection is complicated by small area or quality.

Biogas

Biogas production potential depends on raw materials formation potential. Typically for biogas production are used agricultural production wastes (manure, feed residues, animal carcasses, plant residues), wastewater treatment plant sludge, energy crops (corn and perennial grass silage, sugar beet or fodder beet). In Lithuania there is no statistical data on livestock and poultry manure generation. Therefore, manure production volume is calculated according to breeding animals and birds, as well as their annual manure.

The maximum biogas production from animal manure prospects is in farms with 100 or more cattle. There are 15 such farms in Kaunas district and there are grown about 8000 cattle. Production of pig manure is questionable due to a small number of farms. In Kaunas district there is no large poultry farms and therefore biogas production from poultry manure does not have much potential.

According to Action plan of sustainable energy in Kaunas district, the most promising of all RES is biomass, which balance in RES is expected to be 91% by 2020.

Energy resource	2008	2020
Wood and its products	11.22	5.75
Straw, grass and their products	0.02	11.16
Biogas	2.32	4.34
Shallow geothermal	0	0.44
Solar energy	0	0.16
Wind energy	0	1.6
Total	13.56	23.45

Table 7. Prognosis of RES in Kaunas district for 2020 (ktoe)

3. MARKET NEEDS FOR KAUNAS DISTRICT MUNICIPALITY

3.1 Current Funding Opportunities

This chapter presents current financial opportunities for building owners in Kaunas District Municipality. The instruments include measures financed both under municipal programmes and state programmes funded from the budget of Lithuania or other foreign sources (e.g. EU funds). Below is a brief description of each funding instrument.

Name of the instrument	Using renewable energy resources (solar, wind, geothermal energy, biofuels, etc.) in one- or two-family private homes by replacing fossil fuel-based energy production.
Brief description of the instrument	Administrator – Lithuanian Environmental Investment Fund. Funding is provided under the Climate Change Special Program.
Funded activities	• Installation costs of small capacity solar power units for electricity generation for own needs (not for sale) or installation of solar panels for water heating or heat storage • Installation costs of wind energy sources for own needs (not for sale) • Installation Costs of heat pumps for hot water and thermal energy production for own needs (not for sale)
Type of funding	Subsidy of up to 25% of the costs incurred
Beneficiaries	Owners of private homes
Obtaining funding and other important information	Calls for submission of project registration forms are published in the first half of each year when all the relevant legislation is adopted. Calls must specify the procedure for collecting, registration and evaluation of the registration forms. Level of support – up to 25% of the actual eligible costs incurred, based on documents which support actual costs and payment, but not exceeding EUR 14,500.
Further information available at	http://www.laaif.lt/lt/tinkamos-islaidos/

Name of the instrument	Modernisation of private homes
Brief description of the instrument	Administrator – Lithuanian Environmental Investment Fund. Funding is provided under the Climate Change Special Program.
Funded activities	• Renovation of hot water supply and heating systems; • Replacement of windows, glazing of balconies and loggias, door replacement; • Installation of barriers/walls and blocking of gaps; • Insulation of walls, ceilings, and floors; • Roof insulation or replacement;

	• Installation of recuperation devices and systems; • Energy performance certification of buildings; • Costs of the building materials required for implementing the project, transport costs.
Type of funding	Subsidy of up to 25% of the costs incurred
Beneficiaries	Private home owners
Obtaining funding and other important information	Level of support – up to 25% of the actual eligible costs incurred, based on documents which support actual costs and payment, but not exceeding EUR 14,500. Applicants who renovate (modernise) their homes must also submit the energy performance certificate of the building and a certificate indicating that after the modernisation the building reached energy efficiency Class C and energy consumption costs decreased by at least 20%%.
Further information available	http://www.laaif.lt/lt/tinkamos-islaidos-2/

Name of the instrument	Multi-apartment building renovation (modernisation) programme
Brief description of the instrument	Administrator – Housing Energy Efficiency Agency (BETA). Funding is provided from the budget of the Republic of Lithuania
Funded activities	• Renovation (modernisation) project and expert examination, administration, technical maintenance (100% subsidy); • Measures to increase energy efficiency: renovation of heating, hot water supply, and ventilation systems, insulation of the roof and walls, replacement of windows and doors, modernisation of lifts and electrical systems, and repair of stairwells (30% subsidy); • Additional 10% subsidy for owners of those buildings where the owners have installed a separate/modernised the existing non-automated boiler unit and installed balancing valves or other individual heat meters.
Type of funding	• Preferential credit • Subsidy (compensation)
Beneficiaries	Owners of multi-apartment buildings. Applications may be submitted by municipalities, managers of common areas of multi-apartment buildings, entities which provide administration services for the implementation of the renovation projects of multi-apartment buildings, and administrators who implement municipal energy efficiency improvement programmes.
Obtaining funding and other important information	Planned state aid – EUR 50 million, reimbursement of 30% of the costs incurred on measures which increase energy efficiency. It is planned to renovate at least 500 multi-apartment buildings in Lithuania under this programme. It is planned to pay or compensate 100% of project preparation, implementation administration and construction technical maintenance costs under this call, and also 100% of the costs of those apartment owners most in need (i.e. those eligible to receive compensation of the costs of heating of their homes, supply of drinking water, and hot water costs). Requirements for energy savings:

	• For the multi-apartment buildings, for which compulsory minimum energy performance requirements apply: at least energy performance Class C and reduction of the estimated energy costs by at least 40% compared to those prior to the implementation of the modernisation project. • For the multi-apartment buildings, for which compulsory minimum energy performance requirements do not apply: reduction of the estimated energy costs by at least 25% compared to those prior to the implementation of the modernisation project. • The programme is intended only for multi-apartment buildings (a multi-apartment building means a three- or more family residential building, which may also contain such non-residential premises as retail trade, administrative, catering, etc.). • A multi-apartment building must be built under the construction technical requirements which were in force before 1993. •
Further information available at	https://www.e-tar.lt/portal/lt/legalAct/TAR.AE67B6739526/WThqaVWCcL

Name of the instrument	Modernisation of multi-apartment buildings in Kaunas region under the municipal programme for improving energy efficiency of residential buildings
Brief description of the instrument	Administrator – UAB Komunalinių Paslaugų Centras [utility service centre]. Funding is provided from the budget of Kaunas District Municipality and other multi-apartment building renovation programmes funded by the state (climate change programme, multi-apartment building renovation programme). By the end of 2017, 40 multi-apartment buildings had been renovated in Kaunas District municipal area under this programme.
Funded activities	• Up to 50% of the costs of the preparation of an investment plan; • Subsidy for the renovation of the multi-apartment buildings (insulation of external walls and roof, replacement of windows and doors, modernisation of the hot water supply systems, installation of individual metering devices, and modernisation of ventilation systems. The amount of the subsidy depends on the conditions.
Type of funding	• Preferential credit • Subsidy (compensation)
Beneficiaries	Owners of multi-apartment buildings.
Obtaining funding and other important information	• It is mandatory to reduce the costs of thermal energy consumption by a multi-apartment building by at least 40%, and achieve at least energy efficiency Class D.
Further information available at	https://www.krs.lt/savivaldybe/struktura-ir-kontaktai/administracijos-direktorius/aplinkos-skyrius/daugiabuciu-namu-renovacija/

Name of the instrument	Modernisation of state-owned buildings
Brief description of the instrument	Modernisation of the heated and/or cooled state-owned public buildings by increasing their energy efficiency. Administrator – the Ministry of Energy of the Republic of Lithuania and UAB Viešųjų Investicijų Plėtros Agentūra (VIPA) [public investment development agency]. Funding is provided from the budget of the Republic of Lithuania and the EU Structural Funds.
Funded activities	• Renovation of the hot water supply and heating systems; • Replacement of windows, glazing of balconies and loggias, door replacement; • Installation of barriers/walls and blocking of gaps; • Insulation of walls, ceilings, and floors; • Roof insulation or replacement; • Renovation of lighting, electrical fire safety, drinking water supply, wastewater removal, and drainage systems;
Type of funding	Refund subsidy of up to 100%.
Beneficiaries	Entities who own state-owned public buildings in trust or use them under the lending right (with the exception of state enterprises) and/or the manager of the centrally managed state property.
Obtaining funding and other important information	Funding is carried out by planning state projects. The energy performance class of the buildings – below Class C and the building must be included in the list of buildings eligible for renovation. The aim must be to reduce the energy costs by at least 30%.
Further information available at	Http://enmin.lrv.lt/lt/veiklos-sritys-3/europos-sajungos-parama/europos-sajungos-investicijos-ir-strukturine-parama/2014-2020-m-europos-sajungos-investicijos/valstybei-nuosavybes-teise-priklausanciu-pastatu-atnaujinimas

Name of the instrument	Promotion of the use of biofuels for the production of thermal energy
Brief description of the instrument	Installation of biofuel boilers in the district heating systems. The aim of the instrument is to increase the use of biofuels for heating. Administrator – the Ministry of Energy of the Republic of Lithuania and the public institution Lithuanian Business Support Agency (LBSA). Funding is provided from the budget of the Republic of Lithuania and the EU Structural Funds.
Funded activities	• Installation of biofuel boilers for thermal energy production (capacity of up to 10 MW) in reconstructed or newly built boiler facilities by replacing the use of fossil fuel in the district heating systems.
Type of funding	Non-repayable subsidy
Beneficiaries	Heat suppliers and independent heat producers which operate heating facilities that use fossil fuel.
Obtaining funding and other important information	Project tender. Projects cannot be implemented in the district heating systems where more than 70% of the fuel used for heating comes from biofuels.
Further information available at	Http://enmin.lrv.lt/lt/veiklos-sritys-3/europos-sajungos-parama/europos-sajungos-investicijos-ir-strukturine-parama/2014-

	2020-m-europos-sajungos-investicijos/biokuro-panaudojimo-skatinimas-silumos-energijai-gaminti

Name of the instrument	Replacement of boilers using biofuels with more modern boilers
Brief description of the instrument	Replacement of the boilers using biofuels with more modern in the district heating systems. Administrator – the Ministry of Energy of the Republic of Lithuania and the public institution Lithuanian Business Support Agency (LBSA). Funding is provided from the budget of the Republic of Lithuania and the EU Structural Funds.
Funded activities	• Replacement of boilers using biofuels with more modern boilers (capacity of up to 10 MW) in the district heating systems
Type of funding	Non-repayable subsidy
Beneficiaries	Heat suppliers and independent heat producers which operate old biofuel heat production facilities.
Obtaining funding and other important information	Project tenders
Further information available at	Http://enmin.lrv.lt/lt/veiklos-sritys-3/europos-sajungos-parama/europos-sajungos-investicijos-ir-strukturine-parama/2014-2020-m-europos-sajungos-investicijos/biokura-naudojanciu-silumos-gamybos-irenginiu-keitimas

Name of the instrument	Improving the energy efficiency of public infrastructure
Brief description of the instrument	Administrator – the Ministry of Finance of the Republic. Funding is provided from the budget of the Republic of Lithuania and the EU Structural Funds.
Funded activities	• Modernisation of the heated and/or cooled state-owned public buildings by increasing their energy efficiency; • Modernisation of street illumination by increasing energy efficiency.
Type of funding	Implementation of financial instruments
Beneficiaries	• Suppliers of energy saving services (ESCO); • Municipalities and/or municipal enterprises; • Entities who own state-owned public buildings in trust or use them under the lending right (with the exception of state enterprises) and/or the manager of the centrally managed state property.
Obtaining funding and other important information	The implementation of financial instruments. No further details are available.
Further information available at	Http://enmin.lrv.lt/lt/veiklos-sritys-3/europos-sajungos-parama/europos-sajungos-investicijos-ir-strukturine-parama/2014-2020-m-europos-sajungos-investicijos/energijos-vartojimo-efektyvumo-didinimas-viesojoje-infrastrukturoje

3.2 Policy Background

The programme for Increasing Energy Efficiency in Multi-Apartment Residential Buildings in Kaunas District Municipality is the main local (Kaunas District Municipality) strategic document on which funding for the reduction of energy consumption and increasing the use of renewable energy resources in residential buildings is based.

Main objectives of the programme:

1. To reduce energy consumption in multi-apartment buildings in Kaunas district with the highest energy consumption indicators by at least 20% and to reach at least energy efficiency Class D;
2. To ensure that multi-apartment buildings comply with the essential requirements for the buildings stipulated in legal acts and that the amounts of thermal energy consumed, depending on the climatic conditions of the area and the needs of the population, do not exceed the required limit;
3. To ensure rational use of energy resources and reduction of greenhouse gas emissions.

The programme falls within the medium-term strategy for 2013–2020 and was prepared by taking into account the current state-funded measures on energy, therefore various energy solutions integrated in the Programme are funded from a variety of sources.

The main indicators for the implementation of the programme:

1. To reduce energy consumption costs in the multi-apartment buildings with the highest energy consumption indicators in Kaunas District by at least 20%;
2. To reach at least energy efficiency Class D in the multi-apartment buildings in Kaunas District with the highest energy consumption indicators.

At national level, one of the main strategic documents for the renovation of multi-apartment buildings is the Programme for Renovation (Modernisation) of Multi-Apartment Buildings approved by the Government of the Republic of Lithuania in 2004. The objective of the programme is to reduce consumption of thermal energy (fuel) in multi-apartment buildings built under the technical construction regulations

which were in force prior to 1993 by at least 20% by the end of 2020, i.e. to reduce the estimated annual thermal energy (fuel) costs in these buildings by at least 1,000 GWh and to reduce annual carbon dioxide emissions into the atmosphere by at least 230,000 tonnes compared to those in 2005. The list of deliverables of the programme by 2020:

Evaluation criteria	Unit of measurement	Values		
		2011	2015	2020
Relative reduction of the estimated thermal energy costs in multi-apartment buildings built under the technical construction regulations which were in force prior to 1993 compared to 2005	%	3	8.4	at least 20
Relative reduction of the estimated thermal energy costs in multi-apartment buildings built under the technical construction regulations which were in force prior to 1993 (since 2005)	GWh per year	150	420	1,000
Reduction of carbon dioxide emissions into the atmosphere (since 2005)	tonnes per year	34,000	96,000	230,000
Implemented multi-apartment building renovation (modernisation) projects funded under the Programme and other state-supported or municipal programmes (since 2005)	units	430	1,500	4,000
Implemented energy-saving measures on the initiative of the managers of common areas in the multi-apartment buildings/on the initiative of the residents of multi-apartment buildings	units	3,000	6,000	10,000
Improvement of public awareness	%	45	70	90
Increase in the number of participants of the Programme/ those implementing energy-saving measures independently	%	30	50	60

3.3 Current Local and Regional Investment Projects

This section contains three examples of ongoing or recently completed projects for building renovation or promotion of renewable energy resources in Kaunas District Municipality.

1. **Renovation of the building of Kaunas District Municipality and installation of solar panels**

The building of Kaunas District Municipal Administration is an administrative purpose building located in a densely populated area of Kaunas, next to a busy street. It was constructed in 1979. It is a four-storey U-shaped building with a basement. There is a transformer station in the courtyard of and an underground car park on the left side of the building.

The building – reinforced concrete frame, external wall panels are finished with a decorative terasit plaster surface, sections of the walls are concrete, also finished with decorative terasit plaster, the walls on the side of the courtyard are smooth, painted. The basement of the building is heated.

Total floor area – 3,544.10 m2.

Heated floor area – 3,843.82 m2 (including stairwells).

Heating for the building is supplied by AB Kauno Energija from the district heating system of Kaunas.

Building of Kaunas District Municipal Administration

In 2016, an audit of the consumption of energy resources and cold water in the building was carried out. The audit established that due to the thermal characteristics of the external walls and the outdated heating system the building consumed large amounts

of thermal energy for heating. The conclusion of the audit was that the building should be renovated by insulating its external walls, roof and floor and replacing windows and doors.

After the energy audit of the building in 2016, renovation of the building, funded from the budget of Kaunas District Municipality and the Climate Change Special Programme, commenced. Total value of the renovation project – EUR 1,643,225.42. During the project, the following work was carried out:

1. Renovation of external walls, roof, and the basement floor;
2. Replacement of external doors and windows;
3. Renovation of the heating system;
4. Renovation of the ventilation system;
5. Installation of a solar panel.

The building renovation work was completed in 2017. The improvement in energy efficiency of the building and levels of reduction of CO2 emissions will be assessed in July 2018. Therefore, the effect of the renovation on energy consumption and CO2 emissions will be assessed only after the 2018 assessment. Planned CO2 emission reduction:

Table 2.1. Planned changes in CO2 emissions following the renovation of the building of Kaunas District Municipal Administration.

Emissions	Unit of measurement	Prior to the implementation of the project	Planned after the implementation of the project	Change
CO2	In tonnes CO2 equivalent per year	300.14	228.13	72.01 (- 24 %)

After renovation, the planned reduction in CO2 emissions is 24%, i.e. Co2 emissions of the building will be reduced by almost a quarter. In view of the fact that the renovation of the building was necessary to ensure proper conditions for people working in the building, to resolve the biggest problems concerning the suitability of the building for use, and to create proper conditions for employees of the building, in further stages of the renovation greater emphasis will be placed on further reduction of CO2 emissions.

2. Modernisation of multi-apartment buildings in Kaunas District Municipality

Currently, modernisation of multi-apartment buildings is carried out under the Programme for Increasing Energy Efficiency in Multi-Apartment Buildings of Kaunas District Municipality. By 31 December 2017, 40 multi-apartment buildings were renovated. The total value of the 40 renovation projects – EUR 10,920,000, funding allocated for the projects – EUR 5,560,000. The following renovation measures were implemented: insulation of external walls and the socle, roof insulation and the installation of new roofing material, replacement of windows in the apartments and the stairwell of the building (provided they have not previously been replaced), glazing of exterior door and balconies under a common design, insulation of the basement ceiling, replacement/renovation of piping and equipment of the hot water supply system, modernisation of the heating systems, installation of individual heat metering devices, and replacement/renovation of the ventilation system. After renovation, energy efficiency Class C (37 buildings) or Class B (3 buildings) was achieved and thermal energy consumption decreased by more than 40%. Preparation of the documentation was fully compensated (100%), while 40% of the construction works were compensated by the state of Lithuania and the EU. In 2017, the municipality prepared 9 investment plans for the modernisation of multi-apartment buildings (under call 3 of the Ministry of the Environment, 9 quotas were fixed for Kaunas District Municipality). The owners of the buildings and the Housing Energy Efficiency Agency approved all 9 projects for implementation. Design works were carried out for 7 multi-apartment buildings and funding for a further 2 buildings is still waiting confirmation. Renovation of these multi-apartment buildings is planned to be completed by 31 December 2018. Total value of the 9 renovation projects – EUR 5,002,000, funding allocated for the projects – EUR 1,749,000.

In the next stage, Kaunas District Municipality plans to request the Housing Energy Efficiency Agency to renovate another 20 multi-apartment buildings.

3. Renewable energy technologies in building IX of Kaunas University of Technology

In 2017, researchers from Kaunas University of Technology, Faculty of Electrical and Electronics Engineering and Faculty of Civil Engineering and Architecture initiated a project for the generation and use of renewable energy sources in building IX of the university. The aim of the project is to create an innovative renewable energy generation and storage system for energy supply to the building. The system consists of the following:

- 380 kW solar power system,
- 150 kW ground source heat pumps,
- aquifier thermal energy storage.

The exclusive characteristics of the project is that the aquifier/ice thermal energy storage technology will be used, this, for example, has been implemented at the ECOLAB in Germany. New energy generation and efficient use systems will produce about 375 MWh electricity and about 835 MWh thermal energy per year. As a result, greenhouse gas emissions (CO2) emissions will be reduced by more than 318 tonnes, and this will contribute significantly to the reduction of the impact of harmful emissions on the environment and climate change.

The renewable energy systems worth nearly a million euro will provide an opportunity for students to familiarise themselves with the efficient application of the engineering systems for energy production. The students in the Renewable Energy Study Programme will not only be able to perform laboratory work at the most modern lab of this type in the Baltics, but will also realise their future business ideas.

The project is financed by the Lithuanian Environmental Investment Fund (LAAIF) which distributes EU aid for the development of modern renewable energy sources.

3.4 Policy/Funding Compatibility

1. The main conditions for obtaining funding

Given the current funding instruments for the use of renewable energy sources in buildings and building renovation, those who wish to obtain funding must fulfil the following main conditions specified in the descriptions of the instruments:

- Owners of private homes who wish to obtain funding for renewable energy equipment or the renovation of the building, must declare the costs for the acquisition of the RES equipment or renovation already incurred, i.e. funding is provided after the completion of the work;
- Funding conditions for owners of private homes under the funding instruments are published in the first half of each year and may differ from the conditions announced in previous years;
- Prior to the allocation of funding, owners of private homes and multi-apartment buildings must carry out an energy efficiency assessment of the building, taking into account that the conditions require the reduction of energy consumption;
- After the implementation of the project, energy efficiency certification of the project is required, taking into account that the conditions require that a certain energy efficiency class of the building (at least D or C) must be achieved;
- Requirements which apply to project funding establish that the minimum energy efficiency class that the building must achieve after the implementation of the project must be established;
- Owners of multi-apartment buildings must obtain consent from (the majority of) the residents that the project can be implemented and funded;
- Biofuel boiler capacity limitations (up to 10 MW) apply to the installation or replacement of biofuel boilers in the district heat supply system.

2. Challenges and obstacles to obtain funding

Given the current conditions and requirements of funding instruments for the use of renewable energy sources in the buildings and building renovation, those who wish to obtain funding may face the following challenges and obstacles:

- Since owners of private homes can only obtain funding for projects which have already been completed, they must have the required funds themselves or must

borrow them. Borrowing is related to the risk that funding may not be allocated and the owners will not only have to repay the loan, but also interest. Furthermore, prior to the implementation of the project, owners of private homes must carry out energy efficiency calculations of the building in order to assess energy consumption changes after the implementation of the project. The energy efficiency calculations require hiring specialists, which increases the costs of the project, which may not necessarily be compensated, if the homeowner fails to obtain funding for the project.

- Since funding for the renovation of residential buildings can be obtained for works, which have already been completed, and funding conditions may change every year, home owners risk that after the implementation of the project under the conditions of a certain year they may not obtain funding next year when the conditions change.
- Owners of private homes must get documents for obtaining funding ready and prepare cost accounting, therefore additional costs are incurred for hiring specialists. Furthermore, they face the risk of making errors in their calculations and therefore fail to obtain funding.
- Since the minimum energy efficiency class requirement applies to the implementation of the project, there is a risk that in case of the failure to achieve the requirement, no funding will be achieved or funding will have to be repaid. The energy class requirement restricts the choice of engineering solutions, because the projects focus only on energy savings possibly ignoring such factors as increasing comfort, environment friendliness, suitability of engineering solutions to a building, and durability of engineering measures. Also, energy efficiency certification performed by specialists required after the implementation of the project increases the costs of the project, which in the normal course of events would not be mandatory for the implementation of the project.
- Consents must be obtained from the majority of the residents of a multi-apartment building for the renovation of the building. This makes the process more difficult, because negotiations may take a long time, residents may not reach a consensus or may put forward certain conditions. Thus, not only does the administrative burden increase, but also there is a risk that the project will not be implemented at

all or that this will stir up bad feelings between the residents of the multi-apartment building.

3.5 Market Need

In this section, taking into account the information provided in the preceding sections, the need for new funding instruments is assessed in order to ensure the development of near *zero CO2*-emission *buildings* and renewable energy sources in Kaunas District Municipality.

Current funding instruments and the need for new instruments

Given the current funding instruments described in this document, it can be stated that at the moment the field of renovation of residential buildings is covered very broadly – various instruments are offered to both the owners of private homes and multi-apartment buildings. Renovation of multi-apartment buildings is planned and carried out both on the national and municipal levels, raising awareness and providing information on the rules and benefits of renovation. Although funding instruments do not compensate all incurred costs, a large number of projects leads to conclude that the renovation process takes place smoothly and successfully.

The assessment of the funding instruments for the installation of renewable energy resources shows that such instruments are in place, but are less frequently used by owners of private homes and the primary beneficiaries of such instruments are businesses, public sector institutions (universities, municipal administration or state-owned buildings) or district heating suppliers. One possible reason is that owners of private homes are not familiar with the area of renewable energy sources and that the benefit of the RES installation is frequently less obvious and the pay back on equipment is long-term. For these reasons, the most widely used type of RES in residential home projects is the renovation/purchase of standard biofuel (wood) boilers. Informing residents about RES benefits, financing of such measures under more favourable conditions or inclusion of RES measures in the renovation funding instruments might lead to faster introduction of RES in residential homes, because currently renovation projects include only standard renovation works (insulation of the walls, floor, and roof, replacement of doors and windows, and renovation of heating systems).

Given the existing taxes in Lithuania, there are no direct tax incentives for building renovation or purchase of energy-saving means or RES. The only indirect tax advantage from renovation or RES projects is decrease in the excise duty. Excise duty

applies to the electricity supplied from the general network and fossil fuel (fuel oil, gas oils, natural gas, coal) used for heating. If, as a result of renovation, consumption of electricity and heating is reduced – electricity is generated from RES in the building and fuel, for which no fuel tax is paid, is used for heating (e.g. wood or its waste) – the excise duty paid by residents decreases. Introduction of direct tax incentives is unlikely or necessary due to the complex and lengthy procedure for amending the tax system and due to the current funding instruments directly intended to promote renovation and RES installation in residential homes.

In view of the above, current instruments cover sufficiently widely the reduction of energy consumption in buildings and the use of RES, but in order to achieve better results, it would be beneficial to integrate and promote the installation of RES equipment in residential building in the current instruments.

Promotion and funding of near zero-CO2 emission buildings

Given current funding instruments described in this document, it can be stated that currently there are no funding instruments in Lithuania intended to encourage construction of near *zero CO2*-emission *buildings* or the conversion of existing buildings. Energy efficiency Class C or Class D requirements are applied in the existing funding instruments for renovation of buildings, so owners of the buildings are not interested in investing to achieve energy efficiency Class B or higher. Usually it is not financially beneficial for owners to achieve a higher energy efficiency class, because in order to achieve higher class, the amount of investment significantly increases. Current funding instruments encourage application of the most effective solutions, which require the least investment to achieve the most notable changes in the levels of energy and comfort. This is attested by the statistics on the renovation of multi-apartment buildings in Kaunas District Municipality: out of 40 multi-apartment buildings renovated between 2013 and 2017, 37 achieved energy efficiency Class C and only 3 buildings – class B. Since the construction of the near *zero CO2* emission residential *buildings* is neither attractive to the population nor is it funded, the state or municipality could become a developer of such buildings. The conversion of public buildings to near *zero CO2* emission buildings is attractive, because managers of public buildings are more familiar with the benefits of *zero CO2* emission buildings, have greater financial resources, and do not see only financial payback, but care about the social benefit created by such projects, informing the public, and contributing to the achievement of the strategic objectives of

the country. In terms of the suitability of the buildings of the public sector for conversion to near zero CO2 emission buildings, municipal administration buildings are most suitable for such conversion due to the simplicity of the technical conditions for the renovation of such buildings, smaller administrative burden, poor condition of buildings and their need for renovation.

Promotion of private funding for near zero-CO2 emission buildings

In order to promote private funding for construction of/conversion to near zero-CO2 emission buildings, the main method for promotion should be the model of the Energy Saving Company (ESCO). The method of ESCO is based on the investment made by a specialist ESCO in energy-saving measures. This investment pays off through energy savings; in the European market this usually takes 7–12 years. ESCO guarantees savings on energy consumption and/or the costs of energy consumption and assumes the full financial, technical and implementation risk of the project, e.g. in the cases where project investment is higher than planned or would require additional investments.

ESCO functions and thus services provided to the ESCO building manager may include:

- Energy supply;
- Planning for energy-saving measures;
- Construction works necessary for the measures that increase energy efficiency;
- Technical maintenance of the building and/or energy-saving measures and/or building utility systems (heating, hot water and electricity systems);
- Administrative and other customer service functions;
- Project funding;
- Energy audit;
- Energy consumption monitoring.

Thus, renovating the building on the basis of the ESCO model, the manager of the building pays for the energy service rather than the construction work and does not need to worry about the project implementation and funding. The Energy Service Company performs everything at its own risk. It implements the project looking for the best technical solution and using its knowledge, experience and the latest

technologies. The main advantage of the ESCO model is that the ESCO company ensures project funding and its professional implementation.

The ESCO market analysis carried out in 2017 revealed other possible barriers for further development of the energy efficiency contracts in the future.[1] The decrease in the prices for energy services since 2013, has made investments in energy efficiency less economically attractive. Another relevant problem is caused by differences in the interests of building owners and building users (tenants) with respect to the introduction of the model. This leads to business managers having little interest in renovating the buildings due to uneven distribution of the possible benefits and costs between the three participating parties – building users (tenants), building owner and ESCO. Therefore, in order to apply the ESCO model more broadly, the provisions of the standard energy efficiency contract must also be adapted to other areas, e.g. to the multi-apartment building renovation sector and in the cases where the building (or a part thereof) is leased to another entity.

[1] http://www.esinvesticijos.lt/lt/naujienos/atlikta-europos-etpt-rinkos-analize-patvirtino-dideli-energiniu-islaidu-sutaupymu-potenciala-panaudojus-energijos-vartojimo-efektyvumo-paslaugas

4. POLICY CONTEXT

The Action Plan aims to impact:	☐	Investment for Growth and Jobs programme
	☑	European Territorial Cooperation programme
	☐	Other regional development policy instrument

Name of the policy instrument addressed: **Strategic Development Plan of Municipality of Kaunas District for Year 2013 - 2020**

4.1 ACTION 1

Background

During the ZEROCO2 project one of the activities was to analyze funding tools for Renewable Energy Sources (RES) systems existing in Kaunas District. One of the concerns it is notable that RES funding is used in very rare situations among residential houses owners. The main users of these funding tools are private and public-sector institutions, for example universities, municipalities National government, or central heating providing companies. One of the reasons why it is happening in Lithuania is because Renewable Energy Sources systems are not well known among residential houses owners, RES systems benefits are not obvious, and installation of these systems is not paying off financially. During the ZEROCO2 project activities Study of energy technology options for buildings with zero CO2 emissions in Kaunas District was carried out, other countries project partners good practices learned, and all this led to conclusion of possible and effective installation of RES systems in Kaunas District. However, analyzed type RES systems have very long period of financial pay off, which varies from 8 to 40 years if system is purchased without any government incentives.

Municipality of Kaunas district prepared Program to increase energy consumption efficiency in residential buildings and by this program until year 2017, 40 multi-apartment buildings (buildings with more than 3 apartments) have been already renovated. In the year 2018 renovation is planned for 9 more multi-apartment buildings, but by the newest data of July 2018, in total 51 multi-apartment buildings

have been already renovated. These numbers put Municipality of Kaunas District among top 10 municipalities in Lithuania by the number of renovated multi-apartment buildings (source: Housing Energy Efficiency Agency (BETA)), but still it makes very small share of total multi-apartment buildings number in Kaunas district (about 700 multi-apartment buildings).

Higher installation rate of RES systems in residential houses could be reached by performing wide dissemination of information about RES benefits to the houses owners. Also, by using higher funding rates in funding tools for Renewable Energy Sources (RES) systems and possibility to fund RES systems from buildings renovation funding tools because, as analysis of current funding tools shown, in current building renovation projects only basic renovation activities is funded, for example renovation of walls, roof, windows, doors and central heating systems. Only from the 1st November 2018, terms for funding RES systems will be added to funding tools administrated by BETA. Renovation project quotas for the municipalities are going to be removed and requirement to reach higher than C energy efficiency class, possibilities for joint renovation projects for more than one multi-apartment buildings renovation is same area (block of multi-apartment buildings) will be added to the current building renovation funding tools.

To conclude, there is need for additional incentives to promote RES systems in multi-apartment buildings renovation projects implemented in Kaunas District. These incentives could be included into current or newly formed multi-apartment buildings renovation funding tools.

ACTION

To encourage Renewable Energy Sources (RES) systems installation in residential houses, Municipality of Kaunas District is planning to perform needed steps to include goal for RES systems installation in residential houses in municipality strategic documents. Municipality of Kaunas District is planning to add strategic goal of Renewable Energy Sources projects implementation to Strategic Development Plan of Municipality of Kaunas District. Municipality of Kaunas District in partnership with Ministry of Energy and Funding Bodies is planning to add funding terms for RES systems in currently existing buildings renovation funding tools. Municipality of Kaunas District recommends funding for types of RES systems, which were given

best efficiency evaluation in Study of energy technology options for buildings with zero CO2 emissions in Kaunas District and shown the best potential based on foreign countries best practices examples (especially good practice examples of innovative technologies use in building renovation projects while considering local climate conditions in Finland, good practice examples of social housing apartments renovation projects using photovoltaic sun energy plants in France). The most effective RES systems types evaluated in Study of energy technology options for buildings with zero CO2 emissions in Kaunas District are High efficiency heat pumps, Photovoltaic sun energy plants and Solar thermal flat plates, Solid biomass burning. Municipality of Kaunas District sets goal to reach at least A rating in energy efficiency for at least one multi-apartment building renovation project in 2018–2019 in Kaunas District funded by government funding tools for buildings renovation. Also, the goal sets lowest recommended energy efficiency rating B for all other multi-apartment building renovation projects in Kaunas District (over recommended energy efficiency rating C for current renovation projects). Implementation of joint renovation projects for more than one multi-apartment buildings renovation is same area (block of multi-apartment buildings) will be partially funded from Municipality of Kaunas District budget (funding for local infrastructure and green zones renovation).

Also, Municipality of Kaunas District in cooperation with Housing Energy Efficiency Agency (BETA), disseminates information to residents about cost, paying off length and other benefits of RES systems installation in residential houses. It is planned to organize public events for RES systems benefits presentation to residents of Kaunas District.

These activities promote residential house owners to perform building renovation in conjunction with RES systems installation, to increase energy efficiency, consumption of RES and local energy sources in Kaunas District. Also, these activities contribute to strategic development goals to make better life conditions, create clean and safety environment in Kaunas District. This action is very important for other neighboring municipalities strategic development goals, which are implemented together with Municipality of Kaunas District as it was described in Covenant of Mayors. Also, this action complies with Near zero CO2 emission buildings requirements presented in directive 2010/31/EU of the European Parliament and of the Council “on the energy performance of buildings”.

Players involved

Municipality of Kaunas District

ZEROCO2 project partner in Lithuania, institution responsible for ZEROCO2 action plan activities coordination and successful goals accomplishment.

Specific responsibilities in action implementation:

- Addition of Renewable Energy Sources use in apartment buildings development goal to Strategic Development Plan of Municipality of Kaunas District;
- Cooperation with Ministry of Energy of the Republic of Lithuania, institutions funding and administrating apartment buildings renovation projects, for adding RES systems in current and newly designed funding tools for apartment buildings renovation;
- Cooperation with Housing Energy Efficiency Agency (BETA), for allocating funding to at least one multi-apartment building renovation project implemented in 2018–2019 in Kaunas District to reach at least A rating in energy efficiency;
- In cooperation with Housing Energy Efficiency Agency (BETA), organize public events to present RES systems benefits to residents in Kaunas District. Municipality of Kaunas District is responsible for designating appropriate place and organizational activities.

Funding institutions (Housing Energy Efficiency Agency (BETA))

Housing Energy Efficiency Agency provides consulting services and assistance for homeowners on matters related to the renovation (modernization) of multi-apartment buildings. It also evaluates and approves submitted investment plans and procurement documents, cooperates with municipal authorities, engineering consultancy companies, educational institutions, non-governmental organizations. Moreover, the Agency participates in EU-funded international projects, which in turn strengthens cooperation with housing partners from other countries and enhances skills and experience in developing projects related to the application of alternative energy resources in multi-apartment buildings, and in generating ideas for the

construction of passive houses. It also performs activities related to encouraging homeowners to renovate multi-apartment buildings.

Public Investment Development Agency (VIPA) activities are the provision of financial services, implementation and administration of financial instruments for public sector investment in public infrastructure and public service modernization. VIPA activity includes implementation of financial instruments which provide loans, guarantees for repayable investments or the implementation of similar measures for urban development, optimization of public infrastructure and energy efficiency improvements financed by national, European Union and other financial assistance programs and financing sources (for example., European Investment Bank and other international financial institutions).

More information about institution: http://www.betalt.lt/en/

Specific responsibilities in action implementation:

- In cooperation with Ministry of Energy of the Republic of Lithuania, Municipality of Kaunas District, institutions funding and administrating apartment buildings renovation projects, adjust current and newly designed funding tools for apartment buildings renovation by adding RES systems funding terms;
- In cooperation with Municipality of Kaunas District, adjust terms of apartment building renovation funding tools and allocate funding to at least one multi-apartment building renovation project in 2018–2019 in Kaunas District to reach at least A rating in energy efficiency;
- In cooperation with Municipality of Kaunas District, organize public events to present RES systems benefits to residents in Kaunas District. Housing Energy Efficiency Agency (BETA) is responsible for proposing relevant event content and needed material, providing or recommending lecturers (speakers).

Funds administrative institutions (Environmental project management agency (APVA))

The Republic of Lithuania Ministry of environment Environmental project management agency (APVA) is responsible for administrative tasks for European Union (EU) funds (European Regional Development Fund, Cohesion Fund, LIFE+ funding tools) and environmental projects funded from national budget of Lithuania.

Environmental project management agency offers services to implementors of environmental projects. These services guarantee projects efficiency, rationality and compliance with legal requirements. Main functions consist of applications for funding evaluation, consultations and other information dissemination to applicants, public events organization, preparation of agreements with applicants, projects implementation monitoring, systemizing data about funding projects, public information dissemination.

More information about institution: https://www.apva.lt/en/

Specific responsibilities in action implementation:

- In cooperation with Ministry of Energy of the Republic of Lithuania, Ministry of Environment of the Republic of Lithuania, Municipality of Kaunas District, institutions funding and administrating apartment buildings renovation projects, to adjust current and newly designed funding tools for apartment buildings renovation by adding RES systems funding terms.

Other possible funding sources (commercial banks)

Different type private capital banks offering services in Lithuania (Swedbank, SEB, Šiauliai bank, Luminor and others)

Specific responsibilities in action implementation:

- Provide private funding for apartment buildings renovation projects, offer proper funding terms for projects with RES systems included.

Timeframe

This Action will be set up during the lifetime of the ZEROCO2 project, and then will be ongoing after the conclusion of the project.

Costs:

Cost to Municipality of Kaunas District in not significant, includes only administrative expenditures and expenditures for providing a place for events (seminars). Funding for implementation of joint renovation projects for more than one multi-apartment buildings renovation is same area (block of multi-apartment buildings) will be partially funded from Municipality of Kaunas District budget for year 2019.

4.2 ACTION 2

Background

Currently, because of low energy prices and high construction prices, construction or conversion of standard buildings to zero CO2 emission buildings is very expensive and doubtfully paying off. Building owners analyses best viable options for building renovation and are not minded in risking of personal money. Because of that, building owners are looking for other sources of building renovation funding. Municipality of Kaunas district prepared Program to increase energy consumption efficiency in residential buildings and by this program until July 2018, 51 multi-apartment buildings have been already renovated, but renovated buildings mostly reached only C rating in energy efficiency and heating consumption was reduced up to 40 percent. During ZEROCO2 project, it was identified that building owners do not have finances to install systems which allows reach higher energy efficiency rating after renovation project (B and higher ratings).

To conclude, existing Government and municipality funding tools for buildings renovation are not designed to fund construction or conversion of standard buildings to zero CO2 emission buildings, and that is why private funds is necessary. Private funding is necessary when implementing projects included RES systems, especially for manufacturing companies and individual apartment buildings.

ACTION

To promote construction or conversion of standard buildings to zero CO2 emission buildings from private funds, the most advantageous method is implementation of Energy Saving Company (ESCO) model (ESCO model provides the funding of installation of energy-saving systems, when the installation costs are funded by reduced operational costs of new systems compared to old systems). This model is widely used in collaboration between the public and private sectors). ESCO energy services model is based on specialized ESCO body investments to renovation or RES systems installation project. ESCO body, selected competitively, is responsible to choose best available and suitable technical solutions for the renovation project, by using knowledge and experience gained in other energy projects. ESCO model is suitable to implement in Kaunas District, but during the ZEROCO2 project, some

model weaknesses were identified. By using foreign partners practices in developing ESCO model, it was identified that residents do not want to implement model because of lack of experience and knowledge about model, bad practice in cooperation with private investors. Nevertheless, there many good foreign countries examples of promoting ESCO model which could be implemented in Lithuania: in Slovenia ESCO model promotion is included in National energy efficiency action plan for 2014–2020 years, in Greece ESCO model is regulated at country level in national legislation.

Considering what was identified during ZEROCO2 project, Municipality of Kaunas District aims to increase rate of buildings renovation projects funded by ESCO model and in partnership with other institutions will present ESCO model terms to stakeholders and possible for renovation building owners in Kaunas District. Also, Municipality of Kaunas District will provide recommendations and other suggestions to policy makers to facilitate implementation of ESCO model and to make ESCO model more accessible for public and private building owners, companies owners in Kaunas region.

Implementation of this action will increase number of implemented high energy efficiency projects in Kaunas District and it also will increase the share of this type projects funded from private funds. Also, this action implementation contributes to strategic development goals to create competitive economy, make better life conditions, create clean and safety environment in Kaunas District.

Players involved

Municipality of Kaunas District

ZEROCO2 project partner in Lithuania, institution responsible for ZEROCO2 action plan activities coordination and successful goals accomplishment.

Specific responsibilities in action implementation:

- Addition of ESCO model use in apartment buildings renovation projects funding goal to Strategic Development Plan of Municipality of Kaunas District;
- In cooperation with Public Investment Development Agency (VIPA), organize public events to present ESCO model benefits to residents in Kaunas District. Municipality of Kaunas District is responsible for designating appropriate place and organizational activities;

- Disseminate valuable information about ESCO model benefits and implementation to residents, building and private companies' owners.

Funding and administrative institutions (Public Investment Development Agency (VIPA))

Public Investment Development Agency (VIPA) activities are the provision of financial services, implementation and administration of financial instruments for public sector investment in public infrastructure and public service modernization. VIPA activity includes implementation of financial instruments which provide loans, guarantees for repayable investments or the implementation of similar measures for urban development, optimization of public infrastructure and energy efficiency improvements financed by national, European Union and other financial assistance programs and financing sources (for example., European Investment Bank and other international financial institutions).

More information about institution: https://www.vipa.lt/en/

Specific responsibilities in action implementation:

- In cooperation with Municipality of Kaunas District, organize public events to present ESCO model benefits to residents in Kaunas District. Public Investment Development Agency (VIPA) is responsible for proposing relevant event content and needed material, providing or recommending lecturers (speakers).
- Disseminate valuable information about ESCO model benefits and implementation to residents, building and private companies' owners.
- Administrate funding and application process for building renovation projects implemented by ESCO model.

ESCO entities (ESC UAB, Modus Energy and other)

A wide variety of energy saving, building construction and renovation services offering private companies which also offers RES systems installment and building renovation projects implementation by using ESCO model.

Specific responsibilities in action implementation:

- In cooperation with Municipality of Kaunas District, organize public events to present ESCO model benefits to residents in Kaunas District. Public Investment Development Agency (VIPA) is responsible for proposing relevant event content and needed material, providing or recommending lecturers (speakers).
- Disseminate valuable information about ESCO model benefits and implementation to residents, building and private companies' owners.
- Provide investments and implement building renovation projects by ESCO model.

Timeframe

This Action will be set up during the lifetime of the ZEROCO2 project, and then will be ongoing after the conclusion of the project.

Costs:

Cost to Municipality of Kaunas District in not significant, includes only administrative expenditures and expenditures for providing a place for events (seminars).

4.3 ACTION 3

Background

For the reason of low electricity and energy prices in Lithuania, buildings owners are not interested in energy consumption limitations and saving. Most of the electricity and other energy types users in buildings are not well informed about potential and simple non-technologic tools for energy saving and significant reduction of everyday expenditures.

Municipality of Kaunas District organizes education activities to residents in Kaunas District about energy saving and in year 2018 have already organized 2 events to residents and institutions' employees. During these events lecturers presented opportunities and simple tools how to reduce energy consumption in apartments and offices. One of these events was organized during ZEROCO2 project, another event

was organized in cooperation with The Ministry of Environment during project "Mission Zero" (more about project: http://misijanulis.lt/).

To conclude, despite activities organized by Municipality of Kaunas District, there is still a demand for more information and events among residents in Kaunas District about energy saving.

ACTION

Municipality of Kaunas District, in partnership with energy providers, energy saving tools manufacturers and other entities, educates and informs residents in Kaunas District about energy saving techniques and financial benefits (during the winter, close windows, turn off unused electrical appliances, do not leave the water taps open etc.). During public events benefits of energy saving will be presented to the residents, building owners. Also, during these events, scientist and experts shares their knowledge and experience in energy saving field and use of non-technologic tools for energy saving.

Implementation of this action will increase energy consumption efficiency, energy savings and environment pollution in Kaunas District. Also, this action implementation contributes to create clean and safety environment in Kaunas District. This action will be implemented in close cooperation with local communities and organizations in Kaunas District.

Players involved

Municipality of Kaunas District

ZEROCO2 project partner in Lithuania, institution responsible for ZEROCO2 action plan activities coordination and successful goals accomplishment.

Specific responsibilities in action implementation:

- Addition educating residents in Kaunas District about benefits of energy saving by using non-technologic systems and tools goal to Strategic Development Plan of Municipality of Kaunas District;
- In cooperation with other institutions organize public events to present benefits of energy saving by using non-technologic systems and tools to residents in Kaunas District. Municipality of Kaunas District is responsible for designating appropriate place and organizational activities;

The Ministry of Environment

The Ministry of Environment is the main managing authority of the Government of the Republic of Lithuania which forms the country's state policy of environmental protection, forestry, utilization of natural resources, geology and hydrometeorology, territorial planning, construction, provision of residents with housing, utilities and housing, as well as coordinates its implementation.

Having assessed the data of environmental observations, taken into consideration the conclusions of scientific institutions and the public opinion and following the existing strategic documents and preparing the legal bases, the goals of the Ministry of Environment are:

- to implement the principle of sustainable development,
- to set preconditions for rational utilization, protection and restoration of natural resources,
- to ensure provision of information about the state of environment and its forecasts to the public
- to create conditions for the development of construction business and the provision of residents with housing;
- to ensure a proper environmental quality, considering the norms and standards of the European Union.

More information about institution: http://www.am.lt/VI/en/VI/index.php

Specific responsibilities in action implementation:

- In cooperation with Municipality of Kaunas District, organize public events to present benefits of energy saving by using non-technologic systems and tools to residents in Kaunas District. The Ministry of Environment is responsible for proposing relevant event content and needed material, providing or recommending lecturers (speakers).

Energy providers (Lietuvos energija group)

Lietuvos Energija group is a state-controlled company group which is one of the largest in the Baltic States. The main activities of the Group include power and heat distribution and supply, natural gas trade and distribution as well as construction and maintenance of power plants and grid. The rights and obligations of the shareholder

of Lietuvos Energija group are implemented by the Ministry of Finance of the Republic of Lithuania.

With its more than 4500 employees, Lietuvos Energija group controls and operates key Lithuanian power plants ensuring the security of energy supply, nation-wide distribution network, and services more than 1.6 million consumers across Lithuania, offers services of electricity supply to customers abroad as well as operates 8.5 thousand kilometers of distributor gas pipelines, supplies gas to more than 570 thousand customers, implements development projects of strategic significance and pursues the objectives of the National Energy Strategy.

More information about institution: https://www.le.lt/index.php?lang=2

Specific responsibilities in action implementation:

- In cooperation with Municipality of Kaunas District, organize public events to present benefits of energy saving by using non-technologic systems and tools to residents in Kaunas District. Lietuvos energija group is responsible for proposing relevant event content and needed material, providing or recommending lecturers (speakers).

Other institutions (Housing Energy Efficiency Agency (BETA))

Specific responsibilities in action implementation:

- In cooperation with Municipality of Kaunas District, organize public events to present benefits of energy saving by using non-technologic systems and tools to residents in Kaunas District. Housing Energy Efficiency Agency (BETA)is responsible for proposing relevant event content and needed material, providing or recommending lecturers (speakers).

Timeframe

This Action will be set up during the lifetime of the ZEROCO2 project, and then will be ongoing after the conclusion of the project.

Costs:

Cost to Municipality of Kaunas District in not significant, includes only administrative expenditures and expenditures for providing a place for events (seminars).

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Project: ZEROCO2

Partner organisation: Municipality of Kaunas District

Other partner organisations involved (if relevant): _____

Country: Lithuania

NUTS2 region: Lithuania

Contact person: Gražina Čepulienė _____

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Date:_____

Signature: _____

Stamp of the organisation: _____