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STATE OF ART and SWOT ANALYSIS

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Contents

1. SOCIO-ECONOMIC DATA

Population of Lithuania

The number of inhabitants of Lithuania is decreasing substantially over the past years, compared to the year 2010, the population has decreased by 8% in 2016.

The declining population numbers are to a certain extent influenced by international migration. Lithuania has recorded substantial higher emigration numbers than immigration of persons. Especially the year 2010 when 83,157 persons left the country and only 5,213 persons registered themselves in Lithuania from abroad. The net international migration over the period 2003 to 2015 recorded a negative number of 388,590 persons.

Looking at the internal migration within Lithuania, the constant trend over the past years is that more people moved into urban areas at the expense of rural areas in Lithuania.

From around the 16% minorities living in Lithuania, the Poles are the largest in size (200,317 ethnic Poles), followed by Russians (176,913) and Belarusians (36,227).

The unemployment rate is gradually declining over the past years in Lithuania. Down from 13.2% in 2011, the first quarter of 2016 registered an unemployment rate of 8.3%.

The unemployment rate among men in Lithuania is higher than among women over the past years, though this gap gradually decreased over the past years. In 2015, the unemployment rate among men has been 10.1%, and among women 8.2%.

Income and Expenditures

The average monthly earnings per employee in Lithuania accounted for 714.10 EUR in 2015. The average earnings have increased substantially over the past 2 years; an increase of 10.5% since 2013.

The average disposable income for the year 2014 per capita reached 344.40 EUR per month, where the disposable income in urban areas is higher than in rural areas.

Comparing the earnings between men and women in Lithuania, the gender gap accounted for 16.4% less earnings for women compared to men for the year 2014. Though over the past years the gender pay gap gradually decreased from 23.5% in 2008.

The consumption expenditures per household member per month on housing, water, electricity, gas, and other fuels accounted for 19.24% in 2012, a substantial increase compared to the ca. 13% in the years 2004 and 2008.

Of the 43.74 EUR per month per household member spent on housing, water, electricity, gas and other fuels in 2012, the main expenditure is on heating with 12.91 EUR, followed by electricity (8.86 EUR). In absolute numbers, the average consumption expenditures per household member per month increased by 244% from the year 2004 to 2012.

2. ENERGY AND HEATING SECTORS

Energy Sector in Lithuania

Lithuania's total energy generation capacity is 4,021 MW, of which 68.6 percent is thermal plants, 25.5 percent hydropower plants, and 5.9 percent renewables. The dominant fuels are natural gas, firewood, and other wood waste fuels. Following the 31 December 2009 closure of the Ignalina Nuclear Power Plant, the country's main source of electrical power has been the natural gas-fired Elektrėnai Power Plant. Lithuania now depends on imports. As of 2012, 63 percent of electrical power was imported, and proposals have been made to construct another nuclear power plant in Lithuania.

Although the country's energy intensity fell by 50.4 percent during the period from 1995 to 2004, energy intensity per unit of GDP remains 2.5 times higher than the EU average. The National Energy Independence Strategy 2020-2050 cites energy independence as one of the country's most important goals for 2020. Energy efficiency (EE) policies will be crucial to Lithuania's efforts to decrease energy imports and reach its goal of energy security.

The largest share of final energy consumption is the household and transport sectors at 33 percent each. Households consume the largest share of heat, namely 54 percent. District heating (DH) covers 63 percent of the total heated area in Lithuanian cities. 57 percent of district heating companies are fully owned by the municipalities. The remaining 43 percent of DH companies operate under various public-private partnerships (PPP) arrangements.

District Heating Sector

DH tariffs are not fully cost-reflective, as increases in fossil fuel prices are not passed on to the consumers, which makes many DH companies not financially viable.

As far as heating sector is concerned, in Lithuania all cities have well developed district heating (DH) systems, which are a heritage of planned economy times. Most of the systems are implemented more than 40 years ago and serve more than 50% of final heating demand in total, which has remained constant over the last years.

Even though DH system offers several advantages over individual heating solutions, such as possibility to utilise waste heat, better environmental pollution control, higher efficiency, convenience for end-users, etc. Lithuania currently faces several issues:

1. Around 70% of DH production is based on natural gas, which is fully imported from the single country – Russia, threatening insecurity of supply. In relation to this, the current focal area is how to reduce the consumption of natural gas and thereby dependency on imports. It is restricted though by the biggest DH plants in Vilnius, Kaunas, etc., which operate natural gas CHP plants. In smaller cities though, biomass in DH production is the dominant fuel and its share is increasing constantly. In total, biomass share in the DH production grew from 2% in 2000 up to 27.2% in 2012. Wood is the most common type used, including chips, wood waste, and other sources. By utilising local biomass resources rationally, the share could be increased further. Apart from increasing share of biomass, another measure to fight the issue of dependency on Russian natural gas and to ensure higher level of diversification of fuel sources is floating liquefied natural gas (LNG) terminal, which has been implemented at the end of 2014 and which enables natural gas import from Norway. However, it seems that today the terminal plays a back-up role to improve security of supply, in case problems with natural gas import from the East occur.
2. A significant part of district heat is produced in DH boilers, whereas the rest comes from CHP plants located in the main cities (43% and 56% of heat production in 2010 respectively). Thus, an increasing focus is being currently given to promotion of CHP plants, which produce both heat and electricity and provide substantial advantages in terms of efficiency, reduced pollution, etc.
3. An important issue in the DH sector is old and outdated distribution network, reaching the age of over 30 years. However, during the last decade modernisation of DH distribution system has been carried out and heat losses have been reduced from 25.1% in 2000 down to 15.7% in 2010.
4. Too slow buildings renovation, both public and residential, remains the core issue in the heating sector, which hinders improvements in energy efficiency, reduction in heat production as well as fuel dependency.

The government is taking several measures to increase the financial sustainability of the DH sector, including using biofuels and municipal waste to generate heat, accelerating the renovation of buildings to reduce heat waste, and expanding cogeneration power plants.

The average DH price in Lithuania is 0.072 EUR/kWh during 2014/2015 heating season according to LDHA. The main fuel for heat production is natural gas. Electricity and gas prices in Lithuania are about the same or slightly higher than the EU average. However, heating prices in Lithuania are lower compared with other EU countries because heat prices are a prominent subject in local politics, which often seems to lead to under recouping of costs and investments.

In the Lithuania Regulatory Authority, National Commission for Control of Prices for Energy reviews DH tariffs, which must be justified by DH companies. 3-year tariffs can be adjusted monthly or annually, and municipality councils must adopt a resolution for each new tariff. Through strict regulation and political involvement, local government officials attempt to keep heating tariffs low. However, high energy consumption in the residential sector suggests that the energy subsidies are creating additional costs for the government. Implementing EE measures in buildings would reduce unnecessary energy consumption and help to reduce additional costs.

3. BUILDING SECTOR IN LITHUANIA

a. Housing buildings sector

The Residential Housing Sector

The Lithuania's building stock comprises of around 500 thousand residential buildings and almost 60 thousand non-residential buildings excluding auxiliary buildings, agriculture houses and summerhouses.

Residential buildings can be divided into two main groups:

i. One- and two-apartment buildings (assumed to be individual houses);
ii. Three- and more apartment buildings (multi-apartment buildings including residential buildings for social groups).

Table 1: Lithuanian residential building sector in 2011

Group of buildings	Number	Total area (thousands m2)	Average are per building (m2)
Residential, total	478 889	109 038	
One- and two-apartment	439 769 (92%)	53 482 (9%)	122
Three- and more apartments	39 131 (8%)	55 556 (51%)	1420
Non-residential, total	57 970	36 038	622

As far as multi-apartment buildings are concerned, 15% of total area belongs to 1-2 floor multi-apartment buildings, 65% of the area – 3-5 floor buildings with the rest belonging to buildings with more than 5 floors. An average area per apartment in multi-apartment buildings is around 63 m2, whereas for individual houses typical area is around 122 m2.

In Lithuania, 39,131 multi-apartments buildings contain three or more apartments (2012). Around 35,000 buildings were built according to the technical standard valid until 1993. One of the main features of that period is massive low quality constructions of brick-built and concrete-block multi-apartment buildings, which are characterised as being

energy inefficient and tend to have low energy performance category, due to low thermal resistance of envelopes, outdated inefficient one-pipe heating systems and lack of proper ventilation. In these buildings, annual heat consumption is twice as high as in multi-apartment buildings built after 1993. Differences in heat transfer coefficient values show the differences according to the building period of construction.

Table 2: Heat transfer coefficient values per building codes in force

Years	Heat transfer coefficient values, (W/m2. K)			
	Wall	**Windows**	**Roof**	**Floor**
Until 1994	1.00	2.50	0.83	0.83
1994 - 1998	0.28	2.00	0.22	0.24
1998 - 2005	0.26	1.43	0.18	0.26
After 2006	0.20	1.60	0.16	0.25

66 percent of the population lives in multi-apartment buildings built before 1993. Some 26 percent of multiapartment buildings were built before 1960, 65 percent in 1960-1990, and 9 percent after 1990. Apartments are 97 percent private and only 3 percent belong to the municipal rental stock.

The heating season for multi-apartment buildings in DH systems starts when the average ambient temperature of three days in a row is below 10°C and ends when it is above 10°C. Usually, heating season continues for around 220 days, which is around seven months (October-April).

Although the housing sector consumes 33 percent of final energies, it has the largest energy saving potential - estimated at around 48 percent. Multi-apartment buildings consume about 9.5 TWh of energy per year, and renovated multi-family buildings could save about 4.75 TWh per year.

The Lithuanian District Heating Association (LDHA) divides the entire stock of multi-apartment buildings into four categories depending on the amount of heat consumed.

Table 3: Heat transfer coefficient values per building codes in force

Category of multi-apartment buildings, rated by heat consumption	Average monthly heat consumption (for space heating)*	Heating bill of typical 60m2 apartment**	Share of all multiapartment buildings
I: Least (new and of high quality)	~10 kWh/m2	~600 kWh/60m2 (~35€)	4%
II: Low and moderate (new and with implemented heat saving measures)	~15kWh/m2	~900 kWh/60m2 (~65€)	16%
III: Substantial (old and renovated)	~25 kWh/m2	~1500kWh/60m2 (~91€)	60%
IV: Highest (old ad non-renovated)	~35kWh/m2	~2100 kWh/60m2 (~35€)	20%

*Average heat consumptions during heating season (October – April)
**Average heat price 0.072 €/kWh during 2014/2015 heating season is used (LDHA 2015)

Most buildings are in poor condition and lack proper management. They have inefficient heating systems and equipment and low-quality windows, roofs, and seals between panels.

Average energy consumption in the residential sector was 187 kWh/m2 per year in 2008; for houses built before 1993 it is 160-180 kWh/m2 per year. In the non-residential sector, the average consumption amounted to 244 kWh/m2. Although these figures fall below the EU averages, there is still significant potential for energy savings due to Lithuania's lower per-capita energy use compared with EU levels. Before 2000, final energy consumption in households was decreasing by 3.5 percent each year, but it increased by 2.8 percent per year from 2000 to 2008. Firewood and other wood waste fuels accounted for 35 percent of residential energy consumption, followed by heat (33 percent), electricity (14 percent), and natural gas. The total savings potential by 2020 (with 2009 as the reference year) is 17 percent of the final energy consumption. To achieve these targets will require investing approximately 870 mil. EUR to renovate the least efficient buildings, which consume about 200 kWh/m2 per year. It would require implementing following EE measures: insulation of walls/roofs, replacement of windows, modernization of heat substations, installation of balancing valves/controls, and individual heat metering in each apartment.

Energy use in the housing sector was also responsible for MT of CO2eq emissions in 2014 (about 13.5% of total emissions) and it is expected that CO2eq emissions will

increase until 2020. The projected increase could be curbed by enhanced energy efficiency policies. These policies would contribute to reducing building energy efficiency transaction costs by providing carbon abatement benefits ranging from 100 EUR to 300 EUR per tCO2-eq abated.

Main solutions for energy efficiency measures in the building sector are classified into two main categories:

1. Thermal protection and reduction of energy demand, e.g.:
    i. Improvement of building envelope thermal insulation
    ii. High efficiency windows
    iii. Passive energy systems and components (e.g. passive solar walls)
    iv. Structural works leading to lower energy use (e.g. thermal mass storage)
    v. Passive energy systems and components
2. Improvement of efficiency of building services.
    i. Domestic hot and cold water installations including but not limited to water saving taps, aerators, pressure reduction sets, metering units, heat exchangers, pumps, rain-water harvesting systems, container building-level waste water treatment plants, control and automation
    ii. Mechanical ventilation: balanced ventilation systems, heat recovery units, thermal insulation of pipework and ducts, regulation valves and dampers, control and automation
    iii. Building integrated renewable energy: solar thermal and photovoltaic systems, biomass boilers/stoves with manual/automatic feeding, heat pumps, control and automation
    iv. Efficient use of electricity including, but not limited to efficient domestic appliances, efficient elevators, motors and drives, efficient lighting systems including lighting fixtures, switchboards, safe-guards and power connection with or without associated control and data transfer infrastructure
    v. While most buildings are connected to the district heating systems there is potential for space heating systems including but not limited to high efficiency boilers (e.g. condensing boilers, small and micro-CHP, building level district heating sub-stations, low-emissive burners) with or without automation and control, thermal insulation of pipework and ducts, control

and regulation valves (e.g. thermostatic valves), heat exchangers, pumps, metering and data transfer devices

Administration of Multi-Apartment Buildings

According to Lithuania's Civil Code, the maintenance and administration of multi-apartments buildings are compulsory are managed as follows:

1. A homeowners' association (HOA) may be established (about 17 percent of buildings are managed by HOAs).
2. A joint activity agreement (JAA) may be created between apartment owners (about 3 percent of buildings). Regulated by the Civil Code, the JAA is a form of a partnership suitable for managing common assets. The JAAs advantage over HOAs is that decision-making is based on JAA owners' share of the property, rather than the HOA practice of one vote per apartment owner.
3. If there is no established HOA or JAA, the municipality must appoint an Administrator of a multifamily building to carry out maintenance and administration (about 80 percent of buildings are managed by the Administrator). Appointed administrators are usually municipal housing maintenance companies.

General Situation for Energy Efficiency Investments in Apartment Buildings

During the socialist time the urban areas grew tremendously in population. Whereas in 1945 only 15% of the population lived in urban areas, in 2007 the urban areas counted more than two third of the total population. Approximately 66% of the Lithuanian population lives in multi-apartment buildings built before 1993 (more than 800,000 apartments in 38,000 multi-apartment buildings). 97% of the apartments are privately owned.

District heating (DH) covers 63 percent of the total heated area in Lithuanian cities. 57 percent of district heating companies are fully owned by the municipalities. The remaining 43 percent of DH companies operate under various public-private partnership arrangements.

Heat supplied by DH accounts for 51 percent of the housing stock. 26,636 buildings receive DH heat, of which 73 percent (19,357) are multi-apartment buildings. The number of DH consumers increased from 477,462 to 657,818 (73 percent) in the period

2001 to 2012. Compared with other Nordic countries, Lithuania has very high heat consumption for all buildings.

Although the housing sector consumes 33 percent of final energies, it has the largest energy saving potential (around 48 percent according to a study of the Vilnius Gediminas Technical Universitya). Multi-apartment buildings consume about 9.5 TWh of energy per year, but refurbished multi-family buildings can save about 4.75 TWh per year.

Many of these multi-apartment buildings are in poor condition. The main problems these buildings are facing are old construction standards, inefficient heating systems and engineering equipment, big energy losses, poor quality windows, roofs, seals between panels. From a recently published survey, it showed that more than 57 percent of Lithuanians households are not satisfied with their houses, mainly because of expensive heating and insufficient comfort level.

The urgent need for upgrading and modernization of especially multi-apartment buildings, including the rational use of energy resources has been acknowledged by the Lithuanian government by approving the Lithuanian Housing Strategy in 2004 with a multi-apartment building renovation (modernisation) program. The Programme aimed to increase energy efficiency in no less than 4000 multi-apartment buildings by 2020, and to ensure that cumulative annual heating costs and return on investment cost after the renovation do not exceed the heating costs which was before renovation. The Program attracted commercial banking sector loans alongside state subsidies, which, although initially rising from 15 percent to 30 percent to 50 percent, could not be sustained. In addition, commercial banks were not keen to take risks and issue renovation loans from their own resources, particularly after the financial crisis began. This program ran out of money in late 2007.

In June 2009 the Lithuanian Ministry of Finance and Ministry of Environment signed a Funding Agreement with the EIB establishing an EIB-managed JESSICA Holding Fund. This financing mechanism provided 227 million EUR from EU structural funds and state budget in the form of renovation loans administered by financial intermediaries and subsidies to cover 15 percent of investments, with additional 25 percent subsidy from the Climate Change Fund, and soft loans with a 3 percent fixed interest rate from the JESSICA funds.

Subsidy procedures for low-income persons were also revised in 2013 to support low-income families. This has facilitated the renovation decision-making process among low-income apartment owners.

For the disbursement and administration of credits to renovation project owners, EIB selected as financial intermediaries three commercial banks (AB Šiaulių bankas, AB Swedbank, and AB SEB bankas) and Public Investment Development Agency (VIPA).

Following these revisions, the pipeline of approved EE projects grew to 1,332 by the end of 2013. This represented a substantial increase in demand from earlier programs, where only 1,075 multi-apartment buildings were implemented from 1996 to 2012. Still, these figures together represent only 4 percent of the 35,000 residential buildings built before 1993.

Since 2013 the Program approved more than 3,650 multi-apartment buildings investment projects, of which currently 1,743 apartment buildings are being upgraded. Since 2013, more than 1000 renovation projects have been completed, and since 2004 a total of 1,500 projects have been completed.

The ex-ante assessment of the JESSICA HF 2014 – 2020 revealed the enormous market financing gap of the investment demand and supply of financing of EE projects, especially in the area of modernisation of multiapartment buildings. The reasons for this gap and major obstacles to development of financial instruments have been identified. The following sources of financing have been distinguished as sources of financing of potential energy efficiency increasing measures: the ESI Funds, the Climate Change Programme funds, the funds returned under the JESSICA program (for multi-apartment buildings), funds from banks and own funds. Upon evaluation of all the sources of financing, the availability for the modernisation of multi-apartment buildings has been estimated for 395 million EUR, whereas the demand for investments has been estimated for the modernisation of the multi-apartment buildings for an amount of 1,347.3 million EUR.

The ex-ante analysis for the modernisation of multi-apartment buildings recommends keeping the current financial product of the JESSICA HF: subsidised loan with fixed 3 percent interest rate, compensation of 15 percent interest of the project value and additional 15 percent grant from other sources.

The necessity to pool additional (private) funds into this scheme is very much needed to facilitate the existing financing gap in EE of the multi-apartment building market.

b. Public buildings sector description

In the context of the national law, the definition of a public building is provided only in the Construction Technical Regulation STR 2.20.02:2004. Per this Regulation, a public building is a building used to serve public needs.

The scope of public buildings is narrowed to the public buildings that are owned by the state and municipalities. The above-mentioned Directive 2012/27/EU also exclude buildings which are officially protected as a heritage, buildings owned by the armed forces or central government and serving national defence purposes and buildings used as places of worship and for religious activities.

The main source of information about the public buildings sector Lithuania (e.g. Building ownership, year of construction, building envelope design type) is a real estate register, which is administrated by the State Enterprise Centre of Registers.

Table 4: Public Buildings purpose

Type of the Building	Description
Culture, education and sport	Cultural purposes buildings (cultural centers, libraries, archives, museums, exhibition centers, planetariums, buildings for radio and TV broadcasting, etc) Buildings for educational and scientific purposes (institutes and research institutes, observatories, weather stations, laboratories (except industrial), secondary, vocational and higher schools, kindergartens, nurseries, etc) Buildings for sports (sports halls, gyms, tennis courts, pools, skating-rinks, yacht clubs, shooting-ranges, stadiums, riding halls, etc)
Administration	Administrative purposes buildings (banks, post-offices, state and local governments, embassies, courts, etc)
Hotel, commerce, services, catering and recreation	Short-stay accommodation (hotels, guest houses) Buildings for wholesale and retail trade (bookstores, pharmacies, shopping pavilions, etc)
Medicine	Therapeutic purposes buildings (hospitals, clinics, health centers, sanatoria, rehabilitation centers, special authorities' health care buildings, health resort buildings, medical care buildings, nursing homes, etc) Veterinary clinic buildings
Special religious and other purposes	Buildings for special purposes (barracks, prisons, correctional labor colonies, remand prison, police, fire and rescue buildings, shelters, border checkpoints, etc)
Residential buildings for various social groups	Buildings for residency of different social groups (orphanages, shelters, foster homes, family homes,

	monasteries, etc)
Total	

The table below shows distribution of public buildings by purpose among the state and municipalities.

Table 5: Public buildings in Lithuania, units

	Type of ownership				
	State		Munici- pality		Total amount
	Number	Floor area in m2	Number	Floor area in m2	
Residential buildings for various social groups	303	76 744	239	282 553	303
Administration	1485	1 492 952	753	438 164	1485
Culture, education and sport	996	2 222 849	4288	6 776 901	996
Medicine	386	962 185	670	1 175 194	386
Special religious and other purposes	2361	1 143 399	1642	223 148	2361
Total	**5531**	**5 898 129**	**7592**	**8 895 960**	**5531**

Municipalities own more than a half of public buildings of which public buildings for culture, education and sport purposes comprise the largest part. Public buildings for administration purpose account for one third of the total number of public buildings owned by the state.

According to the requirements of Energy Efficiency Directive 2012/27/EU, “by 31 December 2013, Member States shall establish and make publicly available an inventory of heated [...] central government buildings with a total useful floor area over 500 m2 and, as of 9 July 2015, over 250 m2 . The inventory shall contain the following data:

(a) the floor area in m2 ; and

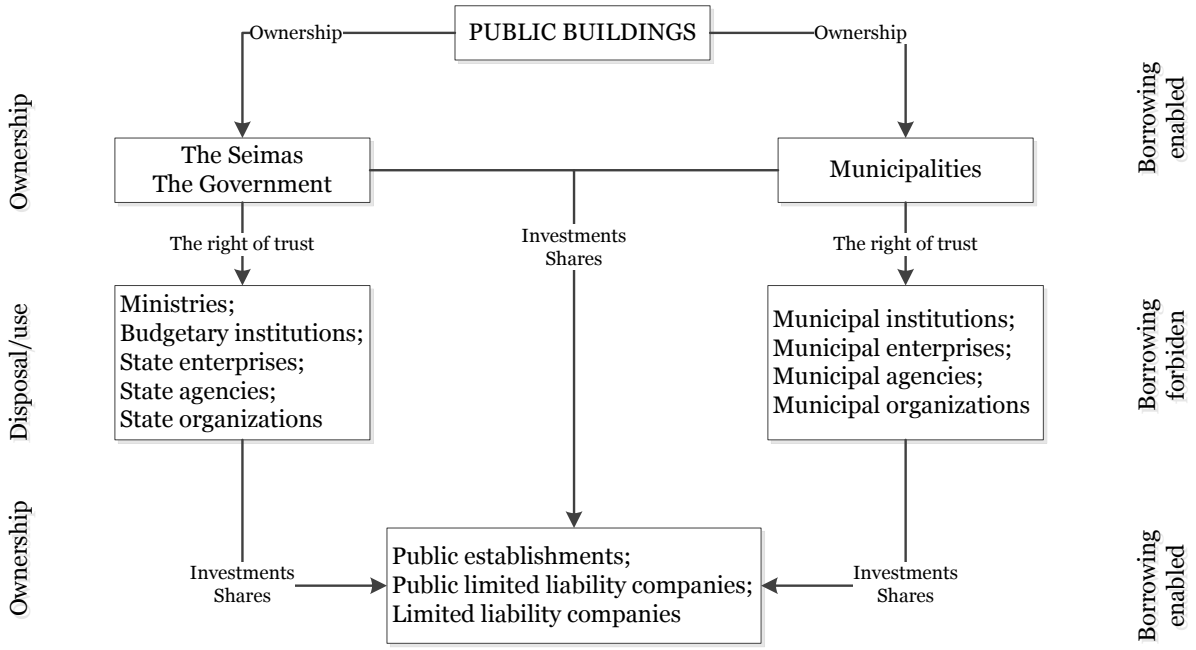
(b) the energy performance of each building or relevant energy data.“

Ownership of buildings and borrowing restrictions

National property, which also includes public buildings, can be owned by the state, which is represented by the Seimas and the Government, and municipalities. Ministries, other budgetary institutions, state enterprises, agencies and organizations can dispose and use public buildings owned by the state by the right of trust. Municipal institutions, municipal enterprises, agencies and organizations can dispose and use public buildings

owned by municipality by the right of trust. Public establishments, limited liability companies, and public limited liability companies established by the state or municipalities and/or their side institutions can own public buildings. Nevertheless, the final owner is the shareholder of a company or the establisher of a public establishment: the state or municipality. A figure representing the ownership of public buildings is shown below.

Figure 1: Public buildings' ownership structure



In case a financial product for public building renovation is a preferential loan or other debt instrument provided to public owners, legal regulations regarding the right of state and municipal institutions to obtain borrowings must be considered. A borrowing issue emerges at both state and municipal level.

In the table below it is provided breakdown of public buildings by construction year.

Table 6: Public buildings breakdown by construction year

Building purpose	Till 1940 m.		1941–1960		1961–1990		1991 and later	
	Number	Floor area in m2	Number	Floor area in m2	Number	Floor area in m2	Number	Floor area in m2
Residential buildings for various social groups	266	157 720	134	150 830	1284	3 188 684	91	140 416

Administration	1567	1 186 380	840	516 519	6159	5 525 261	1437	1 782 062
Culture, education and sport	1557	1 429 368	653	599 530	4670	7 806 173	463	1 231 046
Medicine	426	386 055	193	118 127	1010	1 909 902	210	452 796
Special religious and other purposes	1882	645 911	1319	250 261	13 467	2 750 890	4129	639 338
Total	5698	3 805 434	3139	1 635 267	26 590	21 180 910	6330	4 245 658

Source: The State Enterprise Centre of Registers

Most public buildings were built during 1961-1990. One of the main features of that period is massive low quality constructions of brick-built and concrete-block buildings, which are characterised as being energy inefficient and tend to have low energy performance category. There are also wooden structures and buildings. The external building envelope thermal resistance characteristics are poor and does not meet current regulatory requirements. The heating system in such buildings are out of date and inefficient, engineering and mechanical equipment worn. Thermal energy consumption, expressed in kilowatt-hours of useful indoor space per square meter in these buildings range from 160 to 610 kWh / m2 per year, and these buildings are classified as E, F and G of the building's energy efficiency classes. The heating of public buildings per year average to about 2,300 GWh of thermal energy.

Buildings build until 1990 where in line with the requirements posed by the construction law, but today the requirements are 3-5 times more stringent; e.g. during 1959-1990 wall insulation heat transfer coefficient requirement ranged between 1.1 to 1.3 W / (m2K), and now this figure is 0.2 W / (m2K) or 5 times lower. Considering this fact it is clear that most of the buildings has poor insulated walls (roof, exterior walls, floors and windows) which results in high levels of thermal energy consumption.

The following table presents the distribution of public buildings geographically (buy districts).

Table 7: Public buildings geographical distribution

District	Administration		Culture, education and sport		Medicine		Residential buildings for various social groups		Special religious and other purposes	
	G*	M*	G*	M*	G*	M*	G*	M*	G*	M*
Alytaus	99	44	39	251	27	58	11	15	156	128
Kauno	242	129	244	741	86	116	57	26	607	262
Klaipėdos	158	63	114	443	47	71	34	25	212	184
Marijampolės	61	62	35	303	5	43	17	12	138	219
Panevėžio	113	75	48	421	37	56	30	19	161	157
Šiaulių	210	127	78	544	45	66	27	40	194	148
Tauragės	58	29	19	218	4	27	10	21	80	127
Telšių	55	55	25	237	15	48	11	12	67	102
Utenos	97	58	44	311	14	47	15	19	185	92
Vilniaus	392	111	350	819	106	138	91	50	561	223

* G – Number of government owned buildings. M – municipalities owned buildings

Source: The State Enterprise Centre of Registers

Most of the buildings are heated using central heating systems. In rural areas buildings are heated using local boiler.

Fundamental provisions on the right to borrow are laid down in the Law on State Debt[1]. The exclusive right to administer the state debt belongs to the Ministry of Finance, which represents the Government in borrowing funds on behalf of the state. The Ministry of Finance can borrow funds by undertaking loans, issuing government securities and other debt instruments. The Ministry of Finance is entitled to transfer administration of loans to the state enterprise "Turto bankas". Pursuant to the provisions of Law on the Budget Structure[2], state institutions financed from the budget cannot borrow funds on behalf of the state.

The Law on the Management, Use and Disposal of State and Municipal Assets[3] stipulates that a right to initiate borrowing of funds required for reconstruction of the state immovable property including public buildings upon approval of the Ministry of Finance belongs to the state enterprise "Turto bankas". The Ministry of Finance representing the Government in the process of obtaining borrowings is entitled to borrow funds on behalf of the state on domestic and foreign markets. However, in practice the renovation of public

[1] Law on State Debt (*Official Gazette*, 1996 No. 86-2045, 2011, No. 145-7419).
[2] Law on Budget Structure (*Official Gazette*, 1990, No. 24-596, 2004, No 4-47).
[3] Law on Management, Use and Disposal of State and Municipal Assets (*Official Gazette*, 1998, No. 54-1492, 2002, No. 60-2412).

buildings is not financed under such a scheme. Usually, the scheme is applied to the renewal of public building by selling old and constructing a new building.

The specific project analysis on renovation of public buildings has been carried out. Project types have been analysed in consideration of their compatibility with the Operational Program (OP), possible projects, potential beneficiaries, market failures, relations with the similar projects financed from the EU Structural Funds, examples of FIs application in foreign countries and other features. A brief analysis is provided in the table below.

Table 8: Description of project types – Renovation of public buildings

Project type	Renovation of public buildings
Short description	*This project type is one of the energy efficiency and RES usage priority programs and aims to support public area building renovation. Public buildings renovation excludes itself from other project types as high state priority.*
Axis in Operational Programme	*Priority 4. Energy efficiency and RES usage priority*
Possible projects	*Renovation of municipal buildings, public hospitals, public schools, etc.*
A specification of expected results	*Lithuania as member of EU under the Directive 2012/27/EU on energy efficiency is obligated to renovate 3 % of public buildings each year and to reach 1.5 % total energy savings each year.* *Increase of final energy usage efficiency from 4.5 to 17 by 2023.* *Saved energy comparing to long run average, GWh.*
Potential beneficiaries	*Public institutions, municipalities*
Assessment of value added of particular project type (financial instrument)	
Existence and evidence of market failure:	
Financing market failures	*Currently, financing scheme mostly depends on EU support grants and state budget Crediting public institutions from private banking system is limited and in some cases due to low creditability ratings banks are not willing to provide loans for municipalities.* *For specific type of projects, generating revenue or savings there should be soft loans provided. This would solve strategic investment obstacles.*
Market failures	*Present financing scheme has no leverage to encourage savings or it is limited in public sector institutions.* *As particular institutions have low interest in generating*

	savings, those projects are not catalyzed. *In such case possibility to appropriate the benefits of the activity would accelerate projects' initiation.* *Despite direct economic interest renovation brings wider effect in macroeconomics, social field and environmental protection:* • *Saved money can be invested in other economic growth initiatives;* • *Renovated buildings positively affect local socio climate;* • *Direct renovation effect is energy saving and in most cases reduce CO2 emissions.*	
Appropriateness of the instrument	*Financial engineering allows to posse major financial support for wider applicants range. In another terms, subsidizing measures are very limited, while financial engineering instruments by its origin are revolving, hence in practice only timing limitation apply.* *Moreover, financial instruments are easier to use due to higher flexibility.*	
Incentive effect and necessity of aid	*Investor is more likely to optimize her investment portfolio if investor directly participates in financial flows. Hence, investing its own money and willing to achieve best financial output converges to optimal investment.* *In present situation effectiveness was not internally arisen but set by implementing (controlling) bodies.* *The aid and incentive effect is to reach higher economic value of investment.*	
Proportionality	*Particular investment type is aimed to generate direct savings which should cover significant part of investment amount. Balancing financial product is essential ensuring not to overcompensating investment.* *Well balanced financial product in most cases can deliver optimal result.*	
An assessment of lessons learnt from similar instruments and ex ante assessments carried out by other Member States in the past		
Link to previous programs	**Priority of program**	***Cohesion fund programme***
	Project types or examples	*Renovation of public buildings at national level (Viešosios paskirties pastatų renovavimas nacionaliniu lygiu VP3-3.4-ŪM-03-V)*
	A specification of results	*Public building renovation and*

		reduction of energy consumption. *Indicator: reduced energy consumption - 56 GWh and renovated units - 100.*
	Beneficiaries	*National health sector institutions, national education system institutions.*
	Financial product	*Subsidy: EUCF 75 % and 25 % Lithuanian budget*
	Financing demand	*LTL 993 466 053,73 and 351 tenders*
	Financing amount	*LTL 728 714 993 (LTL 708 250 805,45 and 296 tenders approved)*
Link to previous programs	**Priority of program**	***Cohesion fund programme***
	Project types or examples	*Renovation of public buildings at regional level (lith. Viešosios paskirties pastatų renovavimas regioniniu lygiu VP3-3.4-ŪM-04-R)*
	A specification of results	*Public building renovation and reduction of energy consumption.* *Indicator: reduced energy consumption - 36 GWh and renovated units - 80.*
	Beneficiaries	*Municipalities and its side institutions*
	Financial product	*Subsidy: ESCF 75 % and 25 % Lithuanian budget*
	Financing demand	*LTL 461 847 983,55 and 379 tenders*
	Financing amount	*LTL 318 641 176 (LTL 315 728 229,29 and 278 tenders approved)*
Link to previous programs	**Priority of program**	***Cohesion fund programme***
	Project types or examples	*Renovation of public buildings, which meet energy stability and higher effectiveness quality standards (lith. Viešosios paskirties pastatų renovavimo projektai, atitinkantys Lietuvos 2004–2006 m. Bendrojo programavimo dokumento 1.2*

		priemonės „Energijos tiekimo stabilumo, prieinamumo ir didesnio energetikos efektyvumo užtikrinimas“ naudos ir kokybės vertinimo kriterijus VP3-3.4-ŪM-05-V)
	A specification of results	*Public building renovation and reduction of energy consumption.* *Indicator: reduced energy consumption - 8 GWh and renovated units - 26.*
	Beneficiaries	*State institutions, municipalities or other public institutions*
	Financial product	*Subsidy: ESCF 75 % and 25 % Lithuanian budget*
	Financing demand	*LTL 57 462 746,84 and 22 tenders*
	Financing amount	*LTL 38 935 315 (LTL 42 896 424 and 21 tenders approved)*
Implementation strategy		
Technical assistance needed	• *Administrative assistance on project preparation;* • *Technical support for the project;* • *Legal consulting;* • *Project implementation support;* • *External monitoring and control*	
Government bodies involved	*Managing authority – Ministry of Finance, Ministry of Environment* *Fund Manager – European investment bank* *UDF –BETA* *Financial intermediaries – Public investments development agency, commercial banks.* *Technical assistance – BETA*	
Estimated total investment demand	*LTL 1 000 – 2 000[4] million*	
Co-financing possibilities	*Climate change fund*	
Document source	*Evaluation study: JESSICA instruments for energy efficiency in Greece, March 2010.* *www.esparama.lt information about 2007-2013 financial programing period priorities* *Directive 2012/27/EU on energy efficiency*	

[4] According to the Ministry of Energy.

The analysed types of public buildings are as follows:

- (1) Cultural, educational and sport;
- (2) Administrative;
- (3) Medicine;
- (4) Special religious and other purposes;
- (5) Residential buildings for various social groups.

Scope of analysis

A summary of approximately 600 renovation projects (both national and regional) approved and under evaluation for the 2007-2013 programming period in public building renovation sector has been reviewed. Detailed information on 63 projects in total has been obtained from the Lithuanian Business Support Agency[5] on such subcategories:

- Higher education (1), 9 projects in total;
- Primary and secondary education (1) 13 projects in total;
- Kindergartens (1), 10 projects in total;
- Culture and sport (1), 13 projects in total;
- Administration (2) 5 projects in total;
- Health care institutions (4), 8 projects in total;
- Social care houses (6), 5 projects in total.

A short analysis of the respective projects and the preliminary assessment of their suitability for financial instruments is provided below.

Analysis of investment plans

Projects on renovation of public buildings planned for the 2014-2020 programming period should be used to analyse their potential for financial instruments and develop the EU financing scheme. However, future projects on public buildings renovation shall be like ones implemented or being implemented in the 2007–2013 programming period. Therefore, these projects could be regarded as being representative of public buildings renovation projects planned for the 2014–2020 programming period.

63 public buildings renovation projects approved for the 2007–2013 programming period have been reviewed. Ex-ante energy audits have been performed for investigated

[5] Lithuanian Business Support Agency is the implementing agency responsible for the administration of the funds of European Union which are allotted to the business, research and development, tourism and energy sectors of Lithuania. See: www.lvpa.lt.

projects. Three alternatives have been evaluated to compare estimated results based on the investments made (minimum, medium, and maximum). Key information on the projects selected is provided in the table below.

Based on the analysis performed, it can be stated that public building renovation projects, for which the EU financing in the 2007–2013 programming period has been received, have a considerable potential for the use of financial instruments given the attractive payback periods and achieved energy efficiency savings in some cases. Therefore, a financial instrument in the form of a preferential loan could be used for energy efficiency part of public building renovations and combined with a subsidy-based financing in complex renovation projects. Non-energy efficiency renovation should remain subsidy financed.

The above conclusion has been made solely based on the analysis of projects which applied for the EU financing in the 2007–2013 programming period. In addition, performed a high level analysis of risks related to public building renovation projects was performed. Risk analysis reveals the possibility of decreasing subsidy level without a significant negative impact on financing projects.

Table 9: The summary of the results of analysis of project investment plans (or respective project level document)

	Revenue generating / saving	Payback period in years	Potential to attract private investments	Project management capabilities of project owner	Probability of replication	Overall conclusion on potential for FI
Public buildings:						
Energy efficiency investment	High	4.5 – 79.4	High	Various	High	High
Non energy efficiency investment	Medium	No payback	Low	Various	High	Low

Risk-based analysis

Considering the possibility of inherent drawbacks in the preparation of projects to be implemented in the2007-2013 programming period and the need to motivate the system to enable the shift from grants to FIs, a high level risk analysis of the projects has been conducted. The risks of a material increase in sub-optimal project design and project

implementation, implementation of low priority projects and risks of unused commercial opportunities have been identified in all sectors.

Table 10: The summary of the evaluation of public buildings renovation projects

Risks	Public buildings
Sub-optimal project design and project implementation	High
Implementation of low priority projects	Medium
Lack of project owner commercial motivation	High

Most of risks identified during preliminary analysis relate to a high proportion of a subsidy. Therefore, a decreased subsidy proportion may encourage behaviours which could decrease identified risks but still effectively address market failures for which grant financing was designed.

A subsidy element should remain in the 2014-2020 programming period only for non-energy efficiency renovation.

Overview of public buildings renovation demand

According to Directive 2012/27/EU of the European Parliament and of the Council as of 25 October 2012 on energy efficiency as of 25 October 20126, a mandatory end-use energy-saving target (1.5% energy savings per year) must be established in Lithuania in 2014-2020. Also, 3% of the total floor area of heated and/or cooled buildings owned and occupied by its central government is renovated each year to meet at least the minimum energy performance requirements.

According to EPMA, renovation of public buildings would allow achieving approximately 20% of the mandatory energy-saving target. 950 public buildings have been renovated since 2000; 70% of them were renovated with a support of EU Structural Funds. In order to achieve required annual savings of 20%, Lithuania shall renovate another 3,000 public buildings by 2020. This requires a minimum of LTL 2,500 million. In case of 50% subsidy level, funds needed from EU structures would be equal to at least LTL 1,125 million.

[6] Directive 2012/27/EU of the European Parliament and of the Council of 25 October 2012 on energy efficiency amending Directives 2009/125/EC and 2010/30/EU and repealing Directives 2004/8/EC and 2006/32/EC, OJ L 315, 2012, p. 1.

4. LITHUANIA'S HOUSING STRATEGY

Lithuania's Housing Strategy

Modernizing the residential sector in Lithuania is a key government priority for several reasons:

i. Existing multi-apartment buildings do not comply with technical norms: a large share of the 35,000 of multi apartment buildings were built according to construction norms that were valid until 1993
ii. Housing stock is, by value, the largest national asset.
iii. Household incomes are too low to allow for significant household investment in building modernization.
iv. Residential energy consumption is very high at 160-187 kWh/m2 per year.
v. Low-income owners require state budget subsidies to cover heating costs.

Lithuania's National Energy Independence Strategy identifies increased efficiency of heat consumption in households and public buildings as a national priority. It aims to gradually improve the country's heat production and transportation infrastructure by, for example, replacing inefficient boilers and installing combined heat and power facilities.

Increased energy efficiency in buildings (particularly better insulation) would achieve 2-3 TWh in annual heat savings in 2020 compared to 2011, while reducing consumption of natural gas in district heating, heat production, and transportation infrastructure upgrades could achieve 0.4 TWh of savings annually. These measures would remove 1.1 million tons of CO2 equivalent from the heating sector by 2020, which represents about 5 percent of Lithuania's total 2011 greenhouse gas (GHG) emissions.

Together, the foreseen initiatives would cost the government 3.2-3.8 billion EUR, including the assets of state-owned companies, EU structural funds, and other international support. An additional 3.2-4.0 billion EUR could be attracted from private investors. The investment is intended to reduce annual expenditure on imported energy resources by 0.87-1.2 million EUR, or 3-4 percent of Lithuania's GDP.

The Lithuanian Housing Strategy was approved on January 21, 2004, by the Lithuanian government. Its main goals are to:

1. Expand housing options for all social groups;
2. Strengthen the capacity of the housing sector in the housing market; and
3. Ensure effective use of existing housing, maintenance, upgrading, and modernization, including the rational use of energy resources.

The Legal Framework

The main laws regulating the modernization of multi-apartment buildings in Lithuania are the following:

1. The Civil Code of the Republic of Lithuania. The Civil Code states that the maintenance and administration of multi-apartments buildings are compulsory.
2. The Lithuanian Housing Strategy approved by the Government of the Republic of Lithuania (Resolution No. 60) on January 21, 2004.
3. The Law for State Support to Obtain or Rent House and Modernize Multi-Apartment Buildings defines conditions to provide state support.
4. The Multi-Apartment Buildings Modernization Program defines objectives, tasks, implementation measures, financing sources and implementation mechanisms.
5. The Regulations on State Support for Modernization of Multi-Apartment Buildings and on Supervision of Implementation of Renovation Projects define procedures for providing state support and functions to renovation process participants.
6. The Rules on Credit Taken to Modernize Multi-Apartments, and on Interest Compensation Rules, for Persons with the Right to House Heating Subsidies define credit and interest coverage procedure.
7. The Rules for Projects Preparation for Multi-Apartment Buildings Renovation define investment plan preparation and approval procedures as well as requirements for construction design.
8. The Procurement Rules for Construction Works and Technical Supervision Services for Multi-Apartment Building Renovation regulate construction work and procurement of technical supervision services, when procurement is executed by the body that does not belong to the purchasing organization (such as HOA, administrators, apartment owners under JAAs, etc., for which the Law on public procurement is not applicable).
9. The Homeowners Association Law defines establishment and management of HOA for collaboration in the residential sector.
10. Building Code and Certificates: Lithuania developed its first performance-based building code in 2005 following the adoption of the EU Energy Performance of Buildings Directive (EPBD) 2002/91/EC in 2002, which

requires member states to use energy sources economically and promote energy efficiency.

11. The Technical Regulation of Construction STR 2.01.09:2005 was adopted under the authority of the Ministry of Environment and the Ministry of Energy. A performance-based code covering single and multi-family residential buildings, it requires an energy frame calculation to establish the maximum allowable energy consumption of new buildings. The code addresses low maximum u-values, thermal bridging linear value requirements, heat recovery considerations, mandatory commissioning and testing of boilers and HVAC systems, and compulsory training of energy inspectors. The code enforces conformity to the regulations during construction via third-party inspection.
12. The Building Energy Performance Certificate requires that all new and existing buildings be certified starting from 2007. It evaluates the performance of each building based on its energy consumption. After the evaluation, the building is grouped according to one of nine classes, from A++ (very efficient) to G (inefficient). According to the regulations, the energy class of new buildings should be at least C, and renovated buildings should not be less than D. The certificates are valid for 10 years. The certificates are available to the public on the online database.
13. According to the Regulations on the Inspection of Boiler, Heating, and Air-Conditioning Systems and Methodologies, boilers should be inspected every 2–3 years. Heating installations with boilers with a capacity over 20 kW and older than 15 years should be inspected separately. Air conditioning systems with a capacity higher than 12 kW should be inspected every 3 years. The government covers the cost of the inspections, and residents can request inspections free of charge. One year after the implementation of the scheme, limited interest in inspection and lack of information on the consumer side were the biggest challenges for the legislation.

Energy Efficiency Programmes in Lithuania for the Housing Market

The Lithuania's national Energy Efficiency policy and residential Energy Efficiency program can be roughly divided into three time periods:

First Period: 1996 – 2004.

In the first period the government implemented an Energy Efficiency/Housing Pilot Project, then continued post-project renovation of multi-apartment buildings. Before 1996, government institutions did not have much experience in running complex modernization programs related with housing or public buildings renovation.

Second Period: 2005 – 2010.

After joining the EU in 2004, Lithuania's EE policies were shaped by EU legislation. The Lithuanian Housing Strategy adopted in 2004 specifically addressed the residential sector, and focused on increasing energy savings in households through retrofits of multi-flat buildings. A Multi-Apartment Buildings Renovation Program was adopted that provides loans or subsidies for efficiency upgrades in apartments.

Third Period: 2010 – present.

This period covers implementation that started with introduction of the EU-funded Joint European Support for Sustainable Investment in City Areas (JESSICA) financial instrument.

5. FINANCING GAP

Financial instruments are a sustainable method of financing in the long term and financial instruments become an increasingly important tool[7] aimed at achieving the strategic outcomes. The implementation of financial instruments shall be based on an ex ante assessment[8] which has established evidence of market failures or suboptimal investment situations, and the estimated level and scope of public investment needs, the reasons for the market failure, quantitative and qualitative analysis of different financial products, the considered need for combining financial instruments with grants, alternatives to management of financial instruments and monitoring thereof. Upon evaluation of the need for introduction of the financial instruments aimed at tackling the existing market failures (financing gaps), the types of financial instruments, the management structure thereof, and the investment strategy must be proposed.

The ex ante analysis of energy efficiency includes modernisation of multi-apartment buildings, modernisation of State-owned public buildings and modernisation municipality-owned public buildings.

According to the carried out ex ante assessment of investment demand and supply of financing has shown the market financing gap (the market funding gap shall mean the difference between the investment demand and supply of financing), the reasons for such gap and major obstacles to development of financial instruments. It has been identified that the greatest financing gap has occurred in the area of modernisation of multi-apartment buildings.

In pursuance of evaluating the market failure arising in each of the areas in question, it is necessary to evaluate the availability of financing.

Upon analysis of such availability, the existing financing for energy efficiency projects and potential financing in the period 2014-2020 have been considered. The analysis of the existing financing was based on primary and secondary sources of information. The following sources of financing have been distinguished as sources of financing of potential energy efficiency increasing measures: the ESI Funds, the Climate Change Programme funds, the funds returned under the JESSICA program (for multi-apartment buildings), funds from banks and own funds. Other fund raising sources (other programs funded by the EU) have also been analysed. Upon evaluation of all sources of

[7] Articles (34)-(35) of the Preamble to the “Common Provisions" Regulation
[8] Following Article 37(2) of the “Common Provisions” Regulation

financing, the availability has been identified for each area: for modernisation of multi-apartment buildings – EUR 395 million, for modernisation of municipality-owned public buildings – EUR 88 million, for modernisation of central government public buildings – EUR 103 million.

The carried-out analysis of investment demand and supply of financing has shown the market financing gap (the market funding gap shall mean the difference between the investment demand and supply of financing), the reasons for such gap and major obstacles to development of financial instruments. It has been identified that the greatest financing gap has occurred in modernisation of multi-apartment buildings, however, major market obstacles have been identified in the area of modernisation of central government-owned public buildings aimed at adapting the ESCO model.

The part concerning pooling of extra private funds analyses the scope of investment in increasing energy efficiency and in Lithuania made by such international financial institutions as the European Bank for Restructuring and Development, the Nordic Investment Bank, the European Investment Bank, and the Council of Europe Development Bank. Furthermore, other analysed sources of financing include the Connecting Europe Facility, the Intelligent Energy Europe, Horizon 2020, ELENA, LIFE+Programme (2014-2020), 2020 European Fund for Energy, the Climate Change and Infrastructure (the Marguerite Fund) etc. The levels and ways of private investment attracting and private investment attracting promotion elements have been identified. The analysis revealed that central government owned public building projects require a 20 per cent grant to make such projects bankable.

A summarized financing demand and supply analysis is provided in the table below.

Table 11: Financing demand, supply and gap in modernisation of building sector

	Investment demand, mln. EUR	Investments supply*, mln. EUR	Funding gap, mln. EUR
Central government building renovation	169,7	102,8	**66,9**
Municipality building renovation	234,6	87,8	**146,8**

Multi-apartment building renovation	1347,3	382,6	**964,7**

6. SWOT

Strengths

- A clear source of investments - energy savings, as well as a large savings potential
- Experience from already implemented financial instruments (experience accumulated by public institutions, financial intermediaries)
- Document development and standardization experience allows to simplify the processes and to improve quality of work
- Political support and strategic focus of documents (both at EU level and at national level)
- Facilitated centralized procurement process
- In some areas materialized project pipeline
- Developed technical support competencies (in various agencies) allows more efficient project implementation
- Growing awareness and professionalism at the construction sector
- Clear owners of technical and financial activities – BETA and VIPA
- High satisfaction among final beneficiaries in case of completed projects

Weaknesses

- Fragmented distribution of the final beneficiaries of certain objects (eg. in multi-apartment blocks)
- Some non-renovated objects have already implemented EE measures (diminishing return on the project)
- Relatively high investment need and long return of investments period
- No incentives among building users (usually non-residential buildings) to save energy
- EE project replication solutions are limited because objects purpose and EE investments payback periods vary drastically
- The need of additional state support to ensure bankability of the projects
- The lowest price method procurement can affect the quality of work and reduce the attractiveness of renovation

- Because of demographic problems there is no possibility to insure the need of the building for the entire payback period
- Resistance to financial instruments (building owners prefer subsidy instruments)
- Undeveloped ESCO market
- Overly strict and restrictive legal requirements

Opportunities

- Possibility to attract private investors and international financial institutions and benefit from the opportunities offered by EFSI
- Currently existing low cost and long period funding
- The possibility to combine grants and financial instruments
- Returning cash flows can be re-used for financing new EE projects
- Ability to benefit from document standardization and simplification processes
- Possibility to expand current activities to complex renovation programs
- Opportunities to apply ESCO model
- The possibility to develop sustainable business financing model
- Increased energy independence and cleaner air
- More comfortable living and working conditions (high satisfaction)
- Reduced costs allows to redirecting funds to other uses
- Environment for occurrence of innovative solutions and new business niches
- Increased life time of the buildings

Treats

- Periodically changing technical requirements for buildings
- Long, complex and high administrative burdens requiring processes (eg. PPP)
- Possible project demand-driven increase in construction work prices
- Subsidised heating costs (low heating cost condition long payback periods)
- Political risk and risk of changes in legislation
- Investors don‘t trust EE projects bankability
- The risk of loss of control over a large project pipeline
- The demographic problems in remote areas and smaller cities

- Improper preparation of the technical documentation or poor quality of implemented projects
- EUROSTAT public debt treatment in case of public building modernization
- Insufficient quality control
- Possibility to enter into to new phase of economic crisis
- Demand for heat supply infrastructure renewal resulted by large-scale renovation program
- Decrease in energy prices (impacting payback period)