

Scaling Up Energy Efficiency in Buildings in the Western Balkans

The Residential Energy Efficiency Program in Lithuania

Case Study

May 2014

Prepared by Viktoras Sirvydis



Contents

Abbreviations and Acronyms	3
Executive Summary	4
1. Country and Sector Context	6
Country Context	6
Energy Sector	6
The Housing Sector	8
Administration of Multi-Apartment Buildings	9
Strategy and Legislation	9
Existing Barriers to EE	10
2. EE Programs Implemented and Results Achieved	11
First Period: Energy Efficiency/Housing Pilot Project (1996–2001) and Post-Project Mechanism (2001–04)	11
Second Period: Multi-Apartment Buildings Renovation Program (2005–10)	13
Third Period: Housing Modernization Program through JESSICA (2010–present)	14
3. Lessons Learned	19
Financing and Repayment Arrangements	19
Procurement	20
Technical Assistance/Services	21
Implementation Arrangements, Including Selection/Eligibility Criteria	22
Technical and Other Aspects	23
4. Relevant Implications for the Western Balkans	23
Similarities and Differences	23
Replicating Lithuanian Solutions in the Western Balkans	24
References	26
Annex A. Legal Framework	27
Annex B. Lithuanian Energy Balance 2012	29
Annex C. Parameters of Lithuanian Housing Modernization Programs and Projects	30
Annex D. The Energy Efficiency/Housing Pilot Project 1996–2004: Implementation Mechanism	35
Annex E. Multi-Apartment Buildings Renovation Program, 2005–10: Implementation Mechanism	36
Annex F. JESSICA: Implementation Mechanism	37

Abbreviations and Acronyms

General

CEB	Council of Europe Development Bank
CG	credit guarantee
CPMA	Central Project Management Agency
CPO	Central Purchasing Organization
DH	district heating
EE	energy efficiency
EIB	European Investment Bank
EEHPP	Energy Efficiency/Housing Pilot Project
ESMAP	Energy Sector Management Assistance Program
ESCO	energy service company
EU	European Union
GHG	greenhouse gas
GWh	gigawatt-hour
HESA	Housing Energy Saving Agency
HOA	homeowners' association
HUDA	Housing and Urban Development Agency
IFI	international finance institution
INPP	Ignalina Nuclear Power Plant
JAA	Joint Activity Agreement
JESSICA	Joint European Support for Sustainable Investment in City Areas
kWh	kilowatt-hour
MWh	megawatt-hour
MB	management board
MOF	Ministry of Finance
mtoe	million tons of oil equivalent
NEEAP	National Energy Efficiency Action Plan
PIU	project implementation unit
PPP	public-private partnership
RE	renewable energy
TA	technical assistance
tCO ₂ e	tons of CO ₂ equivalent
TWh	terawatt-hours
UDF	Urban Development Fund

Regional

The Western Balkan region comprises Albania, Bosnia and Herzegovina, Kosovo, the former Yugoslav Republic of Macedonia, Montenegro, and Serbia:

AB	Albania
BiH	Bosnia and Herzegovina
KOS	Kosovo
MK	FYR Macedonia
MNE	Montenegro
SER	Serbia

Executive Summary

This case study, which describes the residential Lithuanian energy efficiency (EE) program and lessons learned, was prepared in support of the Energy Sector Management Assistance Program (ESMAP)-funded technical assistance activity *Scaling Up of Energy Efficiency in Building in the Western Balkans*. During the first period (1996–2004), the World Bank- and donor-funded Energy Efficiency Housing Pilot Project was implemented around investments of US\$28.6 million. In addition, technical assistance (TA) was included to facilitate energy auditor market development, establish centers to provide legal advice to homeowner associations (HOAs), train bank officials, and develop a housing agency to further promote EE investments in the residential sector.

The second period (2005–10) began after the adoption of the 2004 Lithuanian Housing Strategy for Multi-Apartment Buildings Renovation Program. 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.

Therefore, during the third period (2010–13), the Joint European Support for Sustainable Investment in City Areas (JESSICA) financing mechanism was introduced, which provided €227 million 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. For several years, utilization of this mechanism and its implementation was slow. However, project applications began to accelerate after the introduction of municipal renovation programs based on the EnerVizija model, an energy service company (ESCO)-type investment model that created an additional alternative for city- or district-wide renovation programs (a) initiated by municipalities and (b) managed by authorized building administrators, who became borrowers of the renovation loans instead of apartment owners. It is supported with up to a 15 percent subsidy; later, further incentives were introduced, including an additional 25 percent subsidy from the Climate Change Fund and soft loans with a 3 percent fixed interest rate from the JESSICA funds.

These changes accelerate the modernization process in Lithuania from about 70 apartment buildings a year to 490 buildings a year. Subsidy procedures for low-income persons were also revised: a May 2013 law to provide support to low-income families was amended to require eligible households to implement a renovation project or risk a cut in their state subsidy from 50 percent to 0 percent for heating costs for a period of three years. This has facilitated the renovation decision-making process among low-income apartment owners.

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. Total investment in renovated buildings was about Lt 395 million (€114 million), total energy savings was 82.25 GWh/year (8.22 percent of the program's objective of 1000 GWh/year), and total CO₂ reduction was 20,880 tons/year (9.08 percent of the program's objective of 230,000 tons/year)¹.

¹ Stebėsena (Monitoring) <http://www.atnaujinkbusta.lt/index.php/lt/p/atnaujink-busta/apie-programa/stebesena>.

The following summarizes key lessons learned, and relevant recommendations for the buildings renovation process in the Western Balkan countries, based on more than 17 years of Lithuanian experience:

- Renovating the residential sector is a challenging undertaking and may require decades to fully implement. Begin small and test various administrative and delivery mechanisms, and then scale-up successful approaches.
- Support multi-apartment buildings owners in their collective decision-making process, since it is difficult to reach consensus on investment and implementation decisions without the majority's consent. Simple majorities should be sufficient to make investment decisions on HOA borrowing and contracting.
- Where suitable funding sources exist, offer investment subsidies for low-income owners to encourage their participation. However, make provisions for these subsidies to be reduced if low-income owners do not support or refuse to vote in favor of the renovation projects.
- Establish a strong central competence center to help homeowners and HOAs, as the renovation process can be very complex, requiring various tools and management.
- Work closely with municipalities and involve them in the housing renovation programs—including project selection and managing of municipal building renovation programs by professional administrators. Explore ways to use municipal borrowing capacity to bundle apartments and seek simplified contracting methods.
- Create favorable loan products with affordable interest rates (about 3 percent) and sufficient subsidies (up to 30 percent²) to reduce the investment payback periods up to 10 years, in order to make investments more attractive and stimulate demand. But ensure that low-interest loans and grants can be made sustainable and appropriate sources of funding identified.

² The exact subsidy amount for each project will be determined based on renovation measures implemented and energy savings achieved.

1. Country and Sector Context

Country Context

Situated in Northern Europe, Lithuania is the largest of the three Baltic states, with an area of 65,300 km². It had an estimated population of 3 million as of 2013,³ and its capital and largest city is Vilnius. Lithuania regained its independence from the Soviet Union in 1990, and its current constitution was approved by referendum in 1992. On 1 May 2004, Lithuania joined the EU, meaning that significant changes to the legal system took place in little over a decade to meet EU and international standards. The economy grew by 7–8 percent per year after independence until 2008.⁴ The financial crisis hit Lithuania as it did other Baltic states: 2009 saw a dramatic 14.74 percent decline in GDP. As of June 2013, the unemployment rate was 10.4 percent.⁵ Lithuania's GDP per capita is €16,548 (2012), compared with the European Union average of €24,198 (2012). Lithuania's climate is relatively cold. Average temperatures are -5°C in winter and 17°C in summer. Some winters can be very cold: -20°C (-4°F) occurs almost every winter. Winter extremes are -34°C (-29°F) in coastal areas and -43°C (-45°F) in the east of Lithuania.

Energy Sector

The country'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 shutdown on 31 December 2009 of the Ignalina Nuclear Power Plant, a Soviet-era nuclear station, the country's main source of electrical power has been the natural gas-fired Elektrėnai Power Plant. Lithuania now very much 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. The energy balance is summarized in Annex 2, broken down by resource and sector.

Although the country's energy intensity fell by 50.4 percent during 1995–2004, energy intensity per unit of GDP remains 2.5 times higher than the EU average. The National Energy (Energy Independence) Strategy 2020–2050⁶ 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.

Among all sectors, the largest share of final energy consumption belongs to the household and transport sectors at 33 percent each. Households also consume the largest share of heat—54 percent—as shown in Figure 1.

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 (PPP) arrangements. 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. The government is taking a number of

³ http://www.lietuva.lt/en/about_lithuania/quick_facts

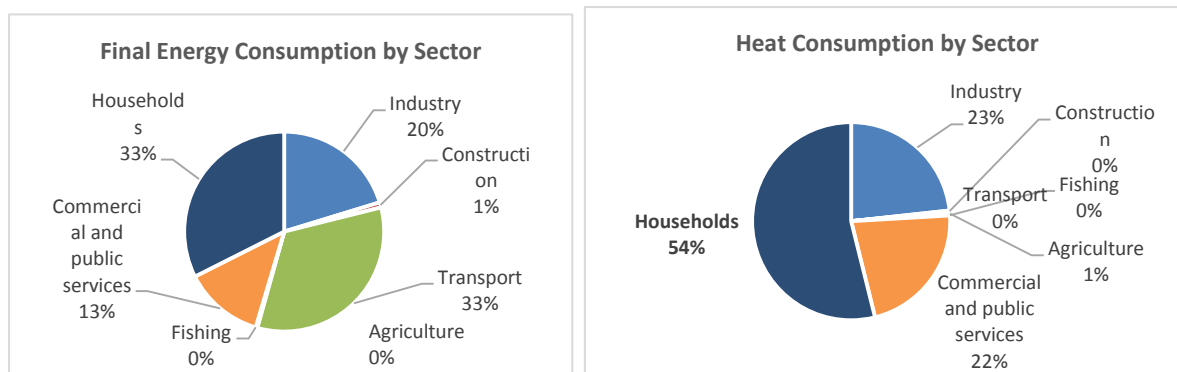
⁴ Department of Statistics of the Government of the Republic of Lithuania, *National Accounts of Lithuania* (Vilnius, 2006), 20.

⁵ Darbo Rinka – Situacija. 26 April 2011. Retrieved on 12 September 2011. <http://www.ldb.lt>.

⁶ http://www.enmin.lt/en/activity/veiklos_kryptys/strateginis_planavimas_ir_ES/NIS_project_2010_2050.pdf.

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.⁷

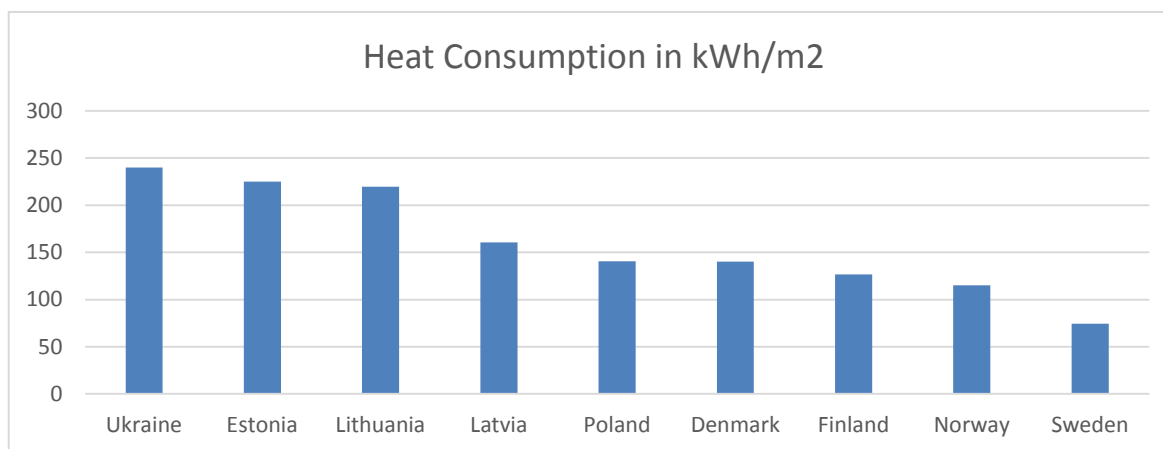
Figure 1. Share of Final Energy and Heat Consumption by Sector



Source: Official Statistics Portal, <http://osp.stat.gov.lt/en>.

The total length of the Lithuanian DH network is 2,497 km. 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 2001–12. However, the number of consumers that have debts for DH-supplied heat remained rather similar at 114,077 (17.3 percent) in 2012. Compared with other Nordic countries, Lithuania has very high heat consumption for all buildings, as shown in Figure 2.⁸

Figure 2. Heat Consumption per Square Meter of Heated Area (kWh/m²)



Source: Euroheat & Power, <http://www.euroheat.org>.

The average DH price in Lithuania is Lt 0.31 per kWh.⁹ 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-coupling of costs and investments. In the Lithuania Regulatory Authority, National Commission

⁷ Lithuanian District Heating Association, “Lithuanian district heating: present situation and barriers for developing” (2008). <http://www.lsta.lt/lt/articles/view/103>.

⁸ CŠT rodikliai 2012 metų statistika http://www.lsta.lt/files/statistika/19493_LSTA_Ukines%20veiklos_percent20apzvalga_2012_WEB.pdf.

⁹ €1=Lt 3.4528.

for Control of Prices for Energy reviews DH tariffs, which must be justified by DH companies. Three-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.

The Housing Sector

In Lithuania, more than 37,267 multi-apartments buildings contain three or more apartments. Around 35,000 buildings were built according to the technical standard valid until 1993. 66 percent of the population lives in multi-apartment buildings built before 1993. Some 26 percent of multi-apartment 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 municipal rental stock.

Although the housing sector consumes 33 percent of final energy, it has the largest energy saving potential—around 48 percent.¹⁰ 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. Multi-apartment buildings are divided into four categories according to their level of heat consumption:

1. 4.6 percent of buildings use a low amount of heat (10 kWh/m² per month); these are newly constructed or high-quality buildings.
2. 17.3 percent use an average amount of heat (15 kWh/m² per month); these are newly constructed or other insulated houses.
3. 55.7 percent of buildings use a high amount of heat (25 kWh/m² per month); these are old houses targeted for renovation.
4. 22.4 percent use a very high amount of heat (35 kWh/m² per month); these are old, very poorly insulated buildings.¹¹

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. More than 57 percent of Lithuanians households are not satisfied with their houses, chiefly because of expensive heating and insufficient comfort level.¹²

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, average consumption amounted to 244 kWh/m².¹³ 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 (10

¹⁰ Presentation by Prof. Vytautas Martinaitis, Vilnius Gediminas Technical University.

¹¹ Lithuanian District Heating Association, "A step ahead from fossil fuel to renewable resources." http://www.lsta.lt/files/Leidiniai/LSTa_knyga_15/LSTA_galutinis%20variantas_2013-04-29.pdf.

¹² "PZU Lietuva" survey carried out by "Spinter tyrimai." http://www.pzu.lt/naujienos/pranesimai_spaudai/maziau_nei_puse_lietuvos_gyventuju_patenkinti_savo_turimu_bustu/p371.print.1.

¹³ <http://www.entranze.enerdata.eu>.

percent).¹⁴ The total savings potential by 2020 (with 2009 as the reference year) is 17 percent of the final energy consumption, yielding 740 ktoe savings per year.¹⁵ To achieve these targets will require investing approximately Lt 2.8 billion 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.

Administration of Multi-Apartment Buildings

According to Lithuania's Civil Code, the maintenance and administration of multi-apartment buildings are compulsory. Multi-apartment building administration can be realized in the following ways:

- A homeowners' association (HOA) may be established (about 17 percent of buildings are managed by HOAs).
- A joint activity agreement (JAA) may be created between apartment owners (about 3 percent of buildings are managed by JAA). Regulated by the Civil Code, the JAA is a form of a partnership suitable for managing common assets. One main advantage of JAAs 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.
- If there is no established HOA or JAA, the municipality must appoint an Administrator¹⁶ of a multi-family building to carry out maintenance and administration (about 80 percent of buildings managed by the Administrator¹⁷). Usually, appointed Administrators are municipal housing maintenance companies.

Strategy and Legislation

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

- 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.
- Housing stock is, by value, the largest national asset.
- Household incomes are too low to allow for significant household investment in building modernization.
- Residential energy consumption is very high at 160–187 kWh/m² per year.
- Low-income owners require state budget subsidies to cover heating costs.

Lithuania's National Energy Independence Strategy sets increasing 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

¹⁴ NEEAP II, p. 5.

¹⁵ National Energy Independence Strategy, p. 34.

¹⁶ In accordance with applicable laws, Administrators of commonly used premises may be (a) an association of multi-apartment buildings, (b) an administrator appointed by the municipality, or (c) a person authorized under JAA concluded by apartment owners.

¹⁷ Other entities than HOA, as HOA also belongs to Administrator. See above definition of Administrator.

district heating, heat production, and transportation infrastructure upgrades could achieve 0.4 TWh of savings annually.¹⁸ 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 sector Lt 11–13 billion (€3.2–3.8 billion), including the assets of state-owned companies, EU structural funds, and other international support. An additional Lt 11–14 billion (€3.2–4.0 billion) will be attracted from private investors. The investment is intended to reduce annual expenditure on imported energy resources by Lt 3–4 billion (€0.87–1.2 million), or 3–4 percent of Lithuania's GDP.

The Lithuanian Housing Strategy was approved on January 21, 2004, by the Lithuanian government.¹⁹ 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.

A summary of the legal framework regulating the renovation of multi-apartment buildings is provided in Annex A.

Existing Barriers to EE

There are five main barriers to EE implementation in Lithuania:

- *Metering.* The heat consumption of multi-apartment buildings is metered at each building's substation; very few buildings have individual heat meters or heat allocators installed in the apartments. Heating costs are divided per apartment based on the heated area of the apartment. District heating companies receiving metering readings from the substations of the buildings, calculate each apartment's bill based on the heated area, then issue bills to the apartment owners.
- *Thermostatic controls.* In the heating system of a Soviet-era apartment building, the radiators are connected in series (rather than in parallel); the flow through one radiator cannot therefore be regulated without affecting the flow through all others on the same circuit. For this reason, radiators were not fitted with controls and homeowners overcame excessive room temperature by opening windows. The fitting of building-level control systems and balancing valves largely eliminates the problem. However, in order for individual homeowners to have full control over their heating, it is necessary to install bypass pipes for all radiators. The installation of bypass pipes is highly intrusive of the living area and is undertaken only where all apartment owners in a building agree to so request.
- *Heat allocation system.* The design of the heating system within Soviet-era apartment buildings is such that, while there are several circuits, each circuit serves multiple apartments; this makes it extremely difficult to fit individual apartment heat metering. However, simple heat-output measurement systems may be fitted to radiators that serve as an encouragement to economize on heating use. These heat allocation systems can be

¹⁸ National Energy Independence Strategy of the Republic of Lithuania.

http://www.enmin.lt/lt/activity/veiklos_kryptys/strateginis_planavimas_ir_ES/Energy_independence_strategy0919.pdf.

¹⁹ English version available at www.am.lt/VI/en/VI/files/0.386991001107419000.doc.

used only in combination with thermostatic controls and where all homeowners in a building support their introduction.

- *Financing.* HOA and other management structures have restrictions on borrowing and may not be sufficiently creditworthy for typical financiers, such as banks.
- *Competing priorities.* Homeowners have limited incomes and many different priorities for investment, of which EE may not be one. Convincing them to do EE, getting sufficient homeowners to agree, carrying out an energy audit, and then arranging loans and signing contracts—all this represents substantial transaction costs as well as time and energy.

2. EE Programs Implemented and Results Achieved

Lithuania's national EE policy and residential EE program may be understood in terms of 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: 2005–10.* 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 dwellings.
- *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.

The remainder of this section discusses each period in turn; all three are summarized in Annex C.

First Period: Energy Efficiency/Housing Pilot Project (1996–2001) and Post-Project Mechanism (2001–04)

The Energy Efficiency/Housing Pilot Project (EEHPP)²⁰ was established in 1996 with the partnership of World Bank, the Danish Ministry of Housing and Urban Development, and the Netherlands Ministry of Foreign Affairs. At the time, the residential sector lacked access to EE financing because government grants and credits for EE investment projects were limited. EEHPP was one of the first projects to target EE financing through a credit line for homeowners and HOAs (see Annex D for a discussion of the implementation scheme).

The project provided (a) credit for EE renovations of residential buildings and schools alongside (b) and technical assistance (TA). Homeowners and HOAs could apply for loans through a commercial bank. These loans were offered in litas (Lt 4 = US\$1) at 11 percent interest rate with a minimum 10 percent down payment (which could be replaced by investments already made)

²⁰ World Bank, *Implementation Completion Report* (2002). http://www-wds.worldbank.org/external/default/WDSContentServer/WDSP/IB/2002/03/29/000094946_0203200400521/Rendered/PDF/multi0page.pdf.

and a maximum 10-year maturity. The bank received a fee comprising 1 percent of disbursements and 3 percent of collections. There was a state grant for 30 percent of the loan principal, not to exceed Lt 50 (US\$12.5) per m² of living area. In addition to the grant, HOAs and individual homeowners were given a partial VAT exemption. The loan repayment was shared between homeowners based on an agreement, usually according to apartment size. Low-income households could use the existing heat subsidies to repay a portion of their EE investment loans. The typical project payback period was reduced from 10–15 years to 5–10 years.

The TA component included setting up advisory centers, strengthening project implementation through support for project preparation (energy audits/investment projects), training of local consultants, training of banks, advising PIU staff, and reinforcing policy reform in the energy and housing sectors. Advisory centers were formed to convince homeowners and HOAs to implement EE by providing free technical, financial, and legal advice. The project initially allocated US\$15.1 million for residential buildings, US\$2.3 million for schools, and US\$2.9 million for institutional development and technical assistance. Funds allocated for each component were later adjusted during implementation because of low demand from HOAs and higher demand from school renovation programs. The low HOA demand was due to (a) the relatively low number of established HOAs that were eligible to receive loans and (b) the high interest rate of the renovation loan.

The following TA package was developed and coordinated by the Housing Credit Foundation (HCF):²¹

- Banking consultants (TNO/Bouwcentrum/CEA, Netherland);
- Energy consultants (TNO/Bouwcentrum/CEA, Netherland and Lithuanian consultants);
- Technical monitoring consultants (i.e. for residential housing SWECO, Sweden; schools-TNO/Bouwcentrum/CEA);
- Social monitoring consultants (i.e. Ramboll, Denmark);
- Public information consultants (COWI, Denmark);
- Public institution HCF advisor (COWI, Denmark);
- Training consultants (Knudsen and Soresen, Denmark);
- Consultants on HOA organization (COWI, Denmark).

After the project ended in 2001, the government of Lithuania extended the program until 2003 using financing from the state budget. The extended program offered up to 30 percent capital subsidies and covered debt service payments for low-income households. US\$22 million was invested for this project in 1996–2003, of which US\$5.3 million was financed by a World Bank loan. The project served 700 multi-apartment and 25 single-family buildings renovated by 2005. The total investment was US\$28.6 million, and the buildings' energy consumption fell by 13–24 percent. Key lessons learned were that (a) even small EE investments (US\$1,000 per apartment) result in expected energy savings and that (b) homeowners are able to repay renovation loans (in many cases the loans were repaid early).

²¹ The Housing Credit Foundation (HCF), a public entity, was established to act as a TA facility and administrator for state loans and subsidies. In 2000 it was renamed and merged with other agency; in 2004 this became the Central Project Management Agency, which transferred its housing-renovation program obligations with five HOA advisory centers to the Ministry of Environment. On this basis, the Ministry of Environment established the Housing and Urban Development Agency (HUDA), which became a TA facility and state subsidy administrator during the second renovation period.

After September 2005, the experience gained during the project was used to design an apartment building renovation project called the “Multi-Apartment Buildings Renovation Program” under the Lithuanian Housing Strategy Program.

Second Period: Multi-Apartment Building Renovation Program (2005–10)

From 2005 to 2010, this program sought to stimulate investments in EE measures by combining commercial loans with up to 50 percent in state grants (the implementation mechanism is reviewed in Annex E). The high level of state budget support was thanks to the country’s rapid economic growth and generated budget income (before the financial crisis). The following package of state support was developed:

- 15–30 percent (2005–07) state subsidies, depending on the EE measures implemented;
- 15, 30, or 50 percent (from February 2007) if C class²² energy performance was achieved;
- Up to 50 percent (until March 2009), with limitation per square meter ;
- Expenses for technical documentation preparation and works supervision could be subsidized up to 50 percent.
- A 100 percent subsidy to low-income families to support investment repayment via a heat subsidy.

From September 2009 the state’s provision of 50 percent financial support declined to 15 percent. Municipalities had limited financial resources to provide additional support to homeowners for project preparation and implementation, and commercial banks were not very keen to risk issuing their own renovation loans.

Still, the program supported low-income households by allowing them to participate in renovation programs, ensuring high-quality implementation, and providing financial, technical, and organizational advice for households, all of which was designed to increase the households’ quality of living conditions.

To encourage EE investments in households, in 2005–09²³ the government set a preferential VAT rate of 9 percent for residential construction, renovation, and thermal insulation services (the standard VAT rate was 18 percent). This was paid for using funds from state and municipal budgets, state-granted preferential loans, and special state funds.

For investment projects whose EE rating (see Table 1) was between 10 and 15 points, the state offered a 15 percent subsidy; for ratings of 15–30 points, a 30 percent subsidy; and for ratings over 30 points, a 50 percent of subsidy—with the condition that all external walls will be insulated.

Although the Renovation Program was quite successful among apartment owners, the state budget resources allocated to the program were limited and, thus, could not be sustained. Therefore, implementation of the program had to be suspended.²⁴ (The possibility of mobilizing EU financial support for the 2007–13 programming period was explored.) During this period about Lt 325 million was invested to renovate 375 multi-apartment buildings. The average

²² According to a Building Energy Performance Certificate classification.

²³ NEEAP II, p. 17.

²⁴ Lithuania Ministry of Environment and Housing and Urban Development Agency. 2011. “JESSICA in Lithuania: An Effort to Renovate Apartment Blocks.” Presentation at JESSICA Networking Platform, Brussels, 31 March.
http://ec.europa.eu/regional_policy/archive/funds/2007/jjj/doc/pdf/JESSICA/31032011_7JESSICA_nwp_310311_lt_apartment_blocks.pdf.

investment per building was about €290,000 (Lt 1 million) and per apartment about €5,800 (Lt 20,000). The program achieved energy savings of 62–65 kWh/m² per year, or about 30–46 percent.

Table 1. Energy Efficiency Indicators

Modernization measure		Energy efficiency rating
1.	<i>Heating and hot water systems repair or modernization</i>	
1.1.	Replacement or modernization of heating substation or boiler (individual boilers)	8
1.2.	Heating and hot water systems repair or modernization, installment of individual heat allocation system and thermostatic valves in the apartments, etc.	12
2.	<i>Replacement of windows</i>	
2.1.	Replacement of windows (replacing at least 80% of windows)	15
2.2.	Replacement of windows (replacing 50-80% of windows)	8
3.	Repair of roofs, modernization, additional insulation, set of new slope roofs (excluding the installation and furnishing of premises)	5
4.	Balcony glazing	3
5.	<i>Facade walls insulation</i>	
5.1.	Insulation of external walls	16
5.2.	Insulation of external walls in the rear of the building	10

Third Period: Housing Modernization Program through JESSICA (2010–present)

In 2009, Lithuania established a lending mechanism for residential EE using funds from JESSICA, a financial instrument developed by the European Commission and the European Investment Bank (EIB) in collaboration with the Council of Europe Development Bank (CEB), and funded through the European Regional Development Fund (ERDF).²⁵ This allowed Lithuania to provide low-interest loans without burdening the state budget.

More specifically, 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.²⁶ The initially approved fund amount was €227 million, of which €127 million was allocated from the ERDF and €100 million came from national match funding. The rules and conditions for participation in the JESSICA-based mechanism were approved by the government. The Housing and Urban Development Agency (HUDA) of the Ministry of Environment was appointed as administrator of these rules and conditions (including administration of the accompanying state subsidy provided to the participating owners of apartments). For the disbursement and administration of credits to renovation project owners, EIB selected as financial intermediaries—or “urban development funds” (UDFs)—three commercial banks (AB Šiaulių bankas, AB Swedbank, and AB SEB bankas) and state-owned Public Investments Development

²⁵ The ERDF is one of two EU Structural Funds dedicated to funding local infrastructure projects. http://europa.eu/legislation_summaries/glossary/structural_cohesion_fund_en.htm.

²⁶ http://ec.europa.eu/regional_policy/the_funds/instruments/jessica_en.cfm. “Contributions from the European Regional Development Fund (ERDF) are allocated to **Urban Development Funds** (UDFs) which invest them in public-private partnerships or other projects included in an integrated plan for sustainable urban development. These investments can take the form of equity, loans and/or guarantees. Alternatively, managing authorities can decide to channel funds to UDFs using **Holding Funds** (HFs) which are set up to invest in several UDFs.”

Agency (VIPA) with its partner the Central Project Management Agency (CPMA).²⁷ The implementation scheme of this JESSICA-supported program is presented in Annex F.

The interest rate on the loan is fixed at 3 percent; the period of the loan is tentatively set between 10 and 20 years (the repayment period may be adjusted in consultation with the financial intermediaries).

The standardized package of measures to be implemented comprises the following:

- Replacement of deteriorated wooden windows with modern, double-glazed, sealed-unit plastic windows;
- Insulation of external walls (including foundation), typically with 15 cm of expanded polystyrene and rendered finish;
- Insulation of roof, typically with 20 cm of expanded polystyrene and watertight finish;
- Replacement of external doors;
- Glazing of balconies;
- Fitting of balancing valves within the heating distribution systems inside the apartment building (this avoids preferential heating of areas closest to the district heating inlet).

New Mechanisms Introduced for the JESSICA Loans

However, despite the evident benefits of EE upgrading in terms of comfort levels and heating cost savings, the take-up rate of the JESSICA-supported national program was very low. The following reasons for the low take-up rate have been identified in the existing methodology, which requires the following:

- The apartment owners must decide (by majority within the building) on the project preparation and implementation. In practice, the apartment owners have different social status, often lack knowledge regarding EE, and are reluctant to make such decisions.
- The apartment owners must be proactive in commissioning a technical project, conducting tendering and contracting, and supervising the upgrading works. This is time-consuming and requires skills that the apartment owners may not have.
- The apartment owners must arrange for a loan with a commercial bank and accept liability for its repayment. In the current difficult economic climate, homeowners are very unwilling to take on long-term loan commitments.
- The approach of upgrading single multi-apartment buildings may also be considered disadvantageous in terms of achieving the lowest works cost for smaller quantities.

The government has since amended the program to allow building administrators to take out loans for the renovations. This facilitates arrangements with the lending institutions and places the management of the loans in professional hands. The loans will be repaid through building administrators out of the savings residents make on heating payments, which are collected by the mechanism of the monthly building administration and communal services fee.

State Grant Subsidy and Other Additional Assistance

State grant subsidies are available that will cover 15 percent of upgrading costs. The subsidy is payable on completion of the EE measures and receipt of a Class C or above Energy Performance

²⁷ VIPA was established to act as a financial intermediary together with CPMA, and both are owned by the Ministry of Finance. VIPA acts as a publicly-owned financing institution providing loans for renovation projects, whereas CPMA performs a technical assistance role related to renovation project selection and appraisal, verification of expenditure, and on-the-spot inspections during implementation.

Certificate. The state grant subsidy is administered by the Housing Energy Saving Agency (HESA)²⁸ alongside the JESSICA-based loan.

The Climate Change Program²⁹ is offering an additional 15-percent-plus-10-percent subsidy (until end 2014) for EE upgrade projects that achieve energy savings of 40 percent or more.

TA is also available to cover 100 percent of technical documentation costs³⁰ and 100 percent of project management costs.

In addition, municipalities located in the Ignalina Nuclear Power Plant (INPP) Region receive both (a) a 10 percent additional investment subsidy and (b) TA for project implementation from an EU-funded Ignalina Nuclear Power Plant decommissioning program. Under this program, the EnerVizija methodology was developed (see following section).

Supplementary assistance to low-income families is as follows:

- Low-income families normally receive state assistance with domestic heating expenses. For this reason, in the context of EE upgrading, the national EE program provides for these families to receive funding of loan repayments;
- Householders who have registered with their municipality and qualify for supplementary assistance will receive full compensation of the loan repayment cost through the municipality, which in turn is compensated by the State;
- On 05.2013 Law on support to low-income families was amended by possibility to decrease the amount of support for low-income persons. In case low-income persons do not participate in adopting decision to renovate multi-apartment building and refuse to participate in renovation, they could loose from 50 percent to 100 percent of state subsidy until renovation project is implemented for a period of 3 years. Such provision encouraged low-income persons to become more active and vote in favor of renovation.

EnerVizija Methodology

Lithuania has developed a new program for EE upgrades called “EnerVizija” (“energy vision”) that seeks to overcome the previously described drawbacks of the existing national program for EE. Its key features are as follows:

- Building renovations are initiated by the municipality, which appoints a project administrator. This makes the municipality responsible for project implementation and ensures the projected results. Homeowners' consent is required to vote for the renovation investments proposed by municipality.
- Loans to fund the upgrading are taken centrally, normally by the building administration company, and repaid through each apartment's monthly building-management fees. This enables the financial arrangements with the banks to be made by professional officials. More importantly, it removes the burden of personal loans from the homeowners and allows the building administration company to assume the credit risk.
- Recognizing municipal institutions lack the capacity to manage major construction projects, TA by a consultant is provided—in particular for the preparation of technical

²⁸ For renovation projects carried out under the previous Renovation Programme, technical assistance was provided mainly by HUDA. In 2013 this function was transferred to the Housing Energy Saving Agency (HESA), which in Lithuanian is Būsto Energijos Taupymo Agentūra, or BETA.

²⁹ The Climate Change Program is a special program aimed at financing measures to mitigate climate change. It is funded by revenues from the sale of carbon credits, GHG emission allowance, and other related sources.

³⁰ Until 2013, this was limited to 50 percent of the costs of technical documentation.

documentation to be used for procurement and supervision of works, contracting, and management of renovations.

- The building upgrades are based on standardized packages of EE measures selected on a cost/benefit basis. The procurement of contractors to carry out the renovations may be done by appointed building administrator for groups of buildings sharing a common design or location, thereby taking advantage of economies of scale. This grouped approach can also facilitate EE improvements in the DH system.

In other respects, EnerVizija makes use of elements of the existing national program: the JESSICA soft loans (loans with a below-market rate of interest), the 15 percent state subsidy, the additional subsidy provided by the Climate Change Program, and administrative oversight by the HESA of the Ministry of Environment and CPMA (Central Project Management Agency), which manages the Ignalina Program.

The EnerVizija methodology is being applied for the first time in the municipalities of the INPP Region and has now been transposed to the entire Multi-apartment Renovation Program implemented through the JESSICA mechanism.

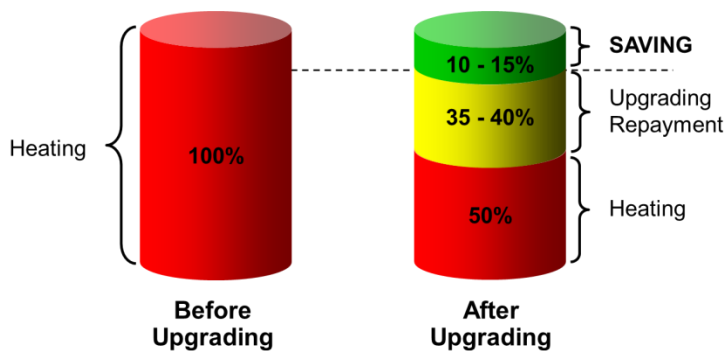
The overall cost of EE renovating the selected residential buildings of one municipality program is likely about €6.0 million. The funding of this cost will be met by a combination of loans and grant subsidy.

In energy service company (ESCO)–type schemes such as EnerVizija, the financial saving on energy consumption is the main contributor to the repayment of the upgrading costs.

During the design of EnerVizija, municipalities selected their least efficient buildings based on records of heating consumption. With TA by professional engineering services, energy audits and investment projects based on cost/benefit analysis were prepared for these buildings. After the implementation of the proposed EE measures in the selected multi-apartment buildings, their EE levels will be raised to Class C; the average saving in heating consumption is calculated to be more than 40 percent, and in some buildings it will be more than 50 percent.

The investment repayment period—which was calculated for each building individually depending on its efficiency before and after upgrading—varies from 10 to 20 years. The repayment calculation allows for an immediate 10–15 percent saving by apartment owners after upgrading. The situation before and after upgrading, taking advantage of the ESCO-type model, is illustrated in Figure 3.

Figure 3. Distribution of Costs to Consumers Before and After Renovation



At the outset of the project, the Project Administrator opens a credit line with the UDF; this is aggregated for all investments foreseen within the buildings concerned. The Project Administrator uses the credit line to pay invoices submitted by the relevant contractor(s) during execution of the upgrading works; the Consultant assists the Project Administrator in ensuring

that all works are correctly implemented and all invoices are accurate. The state grant subsidy and the Climate Change Program subsidy are then disbursed to the UDF through the HESA according to work completed up to that point. For municipalities in the INPP region, the CPMA pays for completed investment projects out of its co-financing contribution.

The beneficiary's payment declaration must be supported by (a) contractor invoices and documents indicating that all work has been completed for the building(s) concerned; and (b) Energy Performance Certificates indicating the requisite level of EE after the upgrading has been achieved (not less than Class C).

Certain small areas within the selected multi-apartment buildings, particularly on the ground floor, are used as commercial premises (services, shops, offices, etc.). According to official data from the Center of Registers,³¹ the proportion of commercial premises in each building varies but does not usually exceed more than 5 percent of the total area. Because it is obviously impractical to upgrade the buildings without including the commercial premises, in the treatment of JESSICA loans by the EIB and of grants from the state authorities, the *de minimis* principle is applied—meaning the commercial premises concerned receive equal treatment with neighboring residential properties.

Procurement

All procurement of construction works and services is conducted according to the Public Procurement Law, with the Project Administrator acting as contracting authority. Where possible, it is conducted electronically via the electronic catalogue of the Central Purchasing Organization (CPO).³² The CPO has concluded framework agreements with contractors to perform a standard package of typical multi-apartment building renovation work. In the electronic catalogue, municipalities can order specific types of renovation work without entering into lengthy procurement procedures. The same technique is used to procure consulting services in relation to building certification, preparation of renovation design or performance of construction supervision services.

For preparation of technical specifications and (if necessary) procurement documents, the Project Administrator can be provided with TA by the Commercial Partner.

Procurement of contractors to carry out EE renovations is limited to those EE measures foreseen in the investment projects and eligible for the state subsidy. Unless otherwise required by the Municipal Architect, all measures will be least-cost solutions.

Results of the EnerVizija Model under the JESSICA Mechanism

Structures created under the EnerVizija Program were later on formalized in the Law on State Support for Housing of 2013. The amendments stipulated an additional alternative, namely, one for implementing city- or district-wide multi-apartment renovation projects (districts are smaller units within municipalities). This alternative is currently promoted by the Ministry of Environment and supported by municipalities. It is expected that the new implementation alternative will accelerate the renovation of multi-apartment buildings across Lithuania. During 2013, municipalities presented a first list of 1,680 multi-apartment building projects in various residential districts. Of these,

³¹ http://www.registrucentras.lt/jar_p_en.

³² <http://www.cpo.lt/en>.

- HESA approved 1,332; of these,
- 917 apartment owners agreed to the projects; of these,
- UDF approved 490 projects; of these,
- 322 projects have entered the procurement phase; and of these,
- 194 projects have commenced.³³

These results show that the EnerVizija model can successfully promote the EE renovation process.

3. Lessons Learned

The lessons Lithuania has learned in designing and implementing programs to address its particular challenges may be broken down into five areas: (a) financing and repayment arrangements; (b) procurement; (c) TA/services; (d) implementation arrangements, including selection/eligibility criteria; and (e) technical and other aspects. Each is presented in terms of an *issue* and a *solution*.

Financing and Repayment Arrangements

Renovation Loan Sources and Conditions

Issue: The Second Period (2005–10) renovation program was based on state grants and commercial bank loans. But although the grants could in theory cover up to 50 percent of EE renovation costs, the state budget resources allocated to the program were insufficient; and due to the economic crisis, it became difficult for apartment owners to borrow from commercial banks. Program implementation had to be suspended. In addition, practical experience from all three renovation periods tells us that the banks are not eager to take risks on renovation projects. Even in the case of JESSICA financing (during the Third Period), no commercial banks have expressed a desire to co-finance renovation loans.

Solution: The source of financing was switched to a combination of (a) EU Structural Fund resources allocated to Lithuania under preferential terms (a 3 percent interest rate), (b) a 15 percent state grant, and (c) an additional 25 percent grant from the Climate Change Program. This model requires less state budgetary resources.

Extended Borrowing Options

Issue: In the case of JESSICA financing, direct borrowing by apartment owners created an administrative burden for the financial intermediaries, which were required to assess each homeowner’s creditworthiness. This was especially difficult when the apartment “owner” was a juvenile or dead and nobody had taken over the apartment. In such cases it was impossible to provide renovation loans because there was no legal owner.

Solution: Each successive renovation program has gradually increased the options for representing apartment owners during renovations of buildings where the HOA is not established. Current legislation allows the Administrator or municipal entity to receive renovation loans on behalf of apartment owners, or on their own behalf but for the benefit of apartment owners. When this happens, apartment owners are not obliged to take a loan—and loan repayment risk is

³³ “Renovacija: kaip sekasi jūsu savivaldybei?” <http://www.am.lt/VI/index.php#a/14046>.

assumed by the Administrator, who collects fixed monthly maintenance payments from the apartment owners.

Financing of Low-Income Apartment Owners and Attracting Their Participation

Issue: Low-income individuals who receive subsidized energy services are not motivated to invest in EE measures that will reduce energy bills. As a result, renovation programs do not often receive the support of low-income apartment owners.

Solution: After renovation, all low-income apartment owners receive a subsidy covering 100 percent of renovation costs, including project preparation costs and loan interest payments. Although previous legal acts contained this provision, they failed to attract sufficient interest from low-income apartment owners. On 16 May 2013, the Law on Social Assistance for Poor Families and Single Residents was amended to state that any low-income persons who fail to participate in the decision to renovate a multi-apartment building and refuse to participate in renovation may lose from 50 percent to 100 percent of subsidies for their energy costs for a period of three years.³⁴ This provision has encouraged low-income apartment owners to become more actively involved in the renovation process and to vote in favor of renovation.

Delayed Repayments of the Loan

Issue: Some of the apartment owners fail to repay loans on time, especially during the last few repayment periods.

Solution: A mechanism agreed specifying how and when the loan repayment can be deferred or extended. Debt service accounts could be used to compensate the lender in the interim.

Procurement

Centralized Procurements

Issue: Preparing procurement documents, and in general executing the public procurement process, requires sufficient know-how and is time-consuming.

Solution: Where the borrower is a municipal entity or building administrator, all services related to renovation and associated preparatory work must be procured through the Central Purchasing Organization (CPO).³⁵ The CPO administers an electronic catalogue³⁶ of centralized public procurements that follows national public procurement procedures established in the Law on Public Procurement. The CPO prepares tender documents and concludes Framework Agreements with many potential contractors and consultants based on their qualifications and unit price proposals. The catalogue list various types of services including renovation with or without additional design consulting, technical supervision of construction work, technical design advice, assessments to obtain required energy certificates, and investment plan preparation. All listed works and services can be purchased directly by the renovation project beneficiary ordering the services. It is expected channeling purchases through the CPO in this manner will facilitate and

³⁴ Article 21(8) of the Law on Social Assistance for Poor Families and Single Residents (*Official Gazette*, 2003, No. 73-3352; 2006, No. 130-4889; and 2011, No. 155-7353).

³⁵ Clause 2.9 of Resolution No. 1725 of the Government of Lithuania (*Official Gazette*, 2009, No. 156-7024).

³⁶ The CPO website is at <http://www.cpo.lt>; the catalog of renovation works and services is at <https://2007.cpo.lt/katalogas>.

accelerate procurement. Detailed instructions have been prepared for using the CPO catalogue to source renovation services.³⁷

Technical Assistance/Services

State Support for Preparatory Work

Issue: Previous legislation stipulated that grants covering the costs of EE preparatory work—project preparation, technical supervision, and project administration—could be awarded only *after* the renovation was completed.³⁸ This meant that apartment owners were required to fund all preparatory work—not to mention the cost of the construction—in advance. This situation obviously did little to encourage EE upgrades.

Solution: The Law on State Support for Housing has established two new ways to finance preparatory work: (a) renovation loans³⁹ and (b) a grant facility for sending invoices related to preparatory work to the Housing Energy Saving Agency (HESA) for immediate payment from state funds.⁴⁰ These changes give apartment owners more flexibility for renovation because they no longer need to save money to pay for preparatory work.

Standard Forms and Building Designs

Issue: State institutions and financial intermediaries require extensive documentation from beneficiaries because the renovation process is complicated.

Solution: The following standard forms have been developed, along with instructions on how to fill them in:

- *Grant application and payment request forms*, which make it easier to provide the data required to (a) confirm state support eligibility and (b) make payments;⁴¹
- *Standard technical designs for renovating common types of apartment buildings*, which accelerates the renovation process and reduces the cost of preparing technical documentation;⁴²
- *A decision-making template that apartment owners can use when seeking approval for renovation projects and applying for loans* (such templates have facilitated apartment-owner HOA meetings and helped financial intermediaries evaluate apartment owners' applications);⁴³
- *Investment plans*;⁴⁴
- *Standard tender documentation*;⁴⁵

³⁷ Ministry of Environment, Pastatų modernizavimo paslaugų užsakymas COP kataloge, at <http://www.am.lt/VI/files/0.308370001370528276.pdf>.

³⁸ The cost of preparatory work varies with the size of the investment. It can range from 2 percent to a maximum of 7 percent of the total investment, with an average of about 4 percent.

³⁹ Article 13 (1)(1) of the Law on State Support for Housing.

⁴⁰ Article 13 (1)(2) of Law on State Support for Housing, Clause 24-28 of the Rules for State Support.

⁴¹ *Other forms (Kitos formas)*, <http://www.atnaujinkbusta.lt/index.php/lt/p/pagalba-igyvendinant/naudingi-dokumentai/standartizuotos-formos>.

⁴² *Typical technical designs (Tipiniai projektai)*, <http://www.atnaujinkbusta.lt/index.php/lt/p/pagalba-igyvendinant/naudingi-dokumentai/tipiniai-projektai>.

⁴³ *Protocol forms (Protokolu formas)*, <http://www.atnaujinkbusta.lt/index.php/lt/p/pagalba-igyvendinant/naudingi-dokumentai/protokolu-formos>.

⁴⁴ Annex A of Description of the Procedures for the Preparation of Renovation (Modernization) Projects of Multi-apartment Buildings (*Official Gazette*, 2009, No. 136-5963, No. 138).

- *An Authorization Agreement* that should be concluded between apartment owners and the municipal entity in case the latter employs a new implementation model in future;⁴⁶ and
- *A template for the Energy Efficiency Program* to be approved by municipalities.⁴⁷

Building the Capacity of Municipal Entities

Issue: The introduction of a new model in which municipal entities are responsible for renovation has raised concerns about whether they are able to implement and administer citywide renovation projects.

Solution: HESA prepared and delivered a training program to municipal entities regarding renovation program implementation issues such as legal framework, finance management, and procurement.⁴⁸ HESA also (a) developed software called “Enervizija IS” to help municipal entities handle payments received from apartment owners and (b) is strengthening its regional representation to make TA more accessible to all municipalities.

Implementation Arrangements, Including Selection/Eligibility Criteria

More Options for Project Implementation, and More Eligible Borrowers

Issue: Early renovation programs were designed to encourage apartment owners directly; municipal institutions were not authorized to pursue any planning of their own. In addition, the number of potential projects was not very high, so all institutional efforts sought to increase, but not manage, the volume of renovation projects.

Solution: This changed following the introduction of the new renovation model based on the EnerVizija experience. In 2013 the Ministry of Environment asked all municipalities to present lists of multi-apartment buildings that could be renovated, and preparation and implementation of investment projects for many of these multi-apartment buildings has already started (see Section 2). Under the new model, responsibility for project implementation and related loans is assumed by the municipality entity/administrator; apartment owners are not required to take any initiative, and their payments for renovation works are treated like any other ordinary payments for utility services. However, these municipalities’ programs target primarily multi-apartment buildings with the lowest EE levels. Therefore, if any other multi-apartment buildings are interested in renovation, they would have an option to initiate renovation individually and use other implementation models where the borrower is an HOA or an apartment owners’ representative.

Control of Renovation Quality

Issue: A key concern of apartment owners has been the quality of renovation works. HESA has historically performed certain functions related to evaluation of renovation quality, but these

⁴⁵ Annex B of Description of the Procedures for the Preparation of Renovation (Modernization) Projects of Multi-apartment Buildings (*Official Gazette*, 2009, No. 136-5963, No. 138); Annexes 1–9 of the Description on the Procurement of Technical Supervision Services and Construction Works (*Official Gazette*, 2010, No. 64-3174).

⁴⁶ Order of the Ministry of Environment dated 3 July 2013 (*Official Gazette*, 2013, No. 72-3618).

⁴⁷ Ministry of Environment, *Energinio efektyvumo didinimo daugiabučiuose namuose programas patvirtinimo forma*, <http://www.am.lt/VI/index.php#a/13123>.

⁴⁸ BETA, *Mokymai administratoriams*, <http://betalt.lt/lt/mokymai-ir-seminarai>.

functions have been too fragmented. The risk of poor-quality renovation was deemed “high” in a study by the Lithuanian District Heating Association.⁴⁹

Solution: Along with the supervisory functions performed by HESA and the State Territorial Planning and Construction Inspectorate, officers appointed by municipalities will also monitor renovations. The Ministry of Environment has also started a separate training program for the State Territorial Planning and Construction Inspectorate during which the newly amended legal framework is addressed, along with particular problems detected in prior renovation work. Additionally it is planned to amend construction agreements such that 10–15 percent of the construction price will be withheld for a year and later used to remedy construction deficiencies. Other possibilities include (a) insuring the quality of renovation work and (b) requiring that contractors pay a deposit that would be returned upon satisfactory completion of the job. All these changes require both amendments to current legislation and agreements with financial intermediaries.

Technical and Other Aspects

Impact of Declining Energy Consumption on Central Heating Systems

Issue: Large-scale EE renovations in cities may affect central heating production and supply systems due to the rapid decrease in heat energy consumption. The National Energy Independence Strategy anticipates that heat consumption will decline by 30–40 percent through planned renovation of multi-apartment buildings until year 2020.⁵⁰

Solution: Cities planning large-scale EE renovations are required to coordinate with heat supply companies to allow them to plan required infrastructure investments. However, it is expected that the negative effect on DH will be diminished by the annual growth in numbers of heat consumers, as heating prices should not increase significantly after renovation.⁵¹

4. Relevant Implications for the Western Balkans

Similarities and Differences

There are a number of institutional and regulatory similarities between the Western Balkan countries and Lithuania because all were formerly part of the Soviet Union and applied quite similar housing construction and maintenance practices. Multi-apartment buildings in the Balkans are very similar to those built in Lithuania before 1993. As in Lithuania, people living in these buildings have different living and social conditions, which makes it very difficult to make renovation decisions. They have similar EE problems with heating in wintertime, although the overall heating season in the Western Balkan countries is somewhat shorter than in Lithuania and cooling loads are higher.

⁴⁹ Lithuanian District Heating Association, “Tesingiausia priemonė renovacijai – paskata,” http://www.lsta.lt/files/studijos/2012_percent20metu/A-77_V.Stankevicius_renovac_paskata.pdf.

⁵⁰ Clause 70 of the National Energy Independence Strategy, approved by Resolution of the Parliament dated 26 June 2012 (*Official Gazette*, 2012, No. 80-4149)

⁵¹ Lithuanian District Heating Association, “Lietuvos šilumos tiekėjų asociacijos pranešimas. Renovavus daugiabučius gyventojų mokėjimai už šilumą tikrai sumažės,” <http://www.atnaujinkbusta.lt/lt/nv/lsta-pranesimas>.

The main difference is that the Western Balkan countries have less DH coverage and more single-family homes than in Lithuania. In Lithuania, because the government focused on renovating the most inefficient multi-apartment buildings built before 1993, it granted only minimal support to single-apartment buildings. However, experience has shown that making renovation investment decisions in single-apartment buildings is much easier than in the multi-apartment buildings—especially when appropriate financial products are available and energy cost savings can be used to repay EE renovation loans in less than 10 years.

Replicating Lithuanian Solutions in the Western Balkans

Early Lithuanian EE programs focused on encouraging HOAs and homeowners to take the initiative to renovate their buildings. Eventually planners recognized it was more efficient to initiate and manage the renovation of multi-apartment buildings on behalf of their owners, with the state or municipality assigning professional project managers.

An analysis of Lithuania’s experience and lessons learned suggests that the following solutions can be replicated for Western Balkans residential EE programs:

- *Adopt a long-term housing strategy with expected quantified results.* This will both focus the EE renovation process and make it more sustainable. The legal and regulatory framework should be amended to cover program design, subsidies and social support mechanisms for low-income families, program management and quality control systems, and regulations for project implementation (such as construction laws, guidelines and building certification regulations). The optimal subsidy would be up to 30 percent, depending on the EE measures implemented: the higher the savings achieved, the higher the proportion of the grant could be provided.
- *Create a competence center.* It is recommended at the national level to establish an institution to coordinate TA while developing tools and methodologies for choosing and implementing renovation projects. These tools might include templates for investment plans and energy audits, typical project designs, procurement solutions, standard procurement documents, decision-making templates for apartment owners, loan administration tools, monitoring of renovated buildings, and publicity and visibility campaigns. Technical assistance can be obtained from the state or international donors or from the EU-funded Instrument for Pre-Accession Assistance (IPA) for EU candidate countries in the Western Balkans.
- *Secure loan resources from international financial institutions (IFIs) and state resources* to (a) provide partial grants to reduce interest rates and (b) cover part of renovation investments. Financial intermediaries could be both private commercial banks and public development banks or public agencies. (Competence centers could also act as financial intermediaries for the state if qualified; renovation processes require program management and technical knowledge in addition to loan administration abilities.) As for the start-up of residential programs, Balkan countries can attract IFIs to act as holding funds and help them set up implementation mechanisms, share knowledge from other countries, and attract EU and multilateral donor funds.
- *Support multi-apartment building owners in the decision-making process.* It is difficult to reach agreement on investments among owners who have different economic conditions and social interests. According to Lithuanian law, decisions to renovate multi-apartment building must be made by a simple “50 percent plus one” majority of votes of all apartment owners. If less than half of apartment owners attend the meeting, it is not possible to make a decision; a second meeting may then be held with the same agenda

and same voting principle—50 percent plus one. To facilitate the decision-making process in the Western Balkans, it is suggested that in the second meeting decisions be made by the simple majority of owners participating in the meeting—not a majority of owners in the building (such a model exists in Estonia). On the other hand, in Lithuania, some renovation process stakeholders believe that renovation decisions should be adopted in a different way. If the state or a municipality decides that certain multi-apartment buildings have to be renovated, they could be added to specific lists without the prior consent of apartment owners. If the owners wish to be excluded from the renovation program, they would have to adopt a separate decision expressly voting against renovation.

- *Provide investment subsidies for low-income owners*—while at the same time advising them that their existing energy bill subsidies will be reduced if they do not support, or refuse to vote in favor of, the renovation. Lithuanian experience shows that the possibility of receiving benefits for a short time, rather than a longer undefined period, increases motivation.
- *Partner with municipalities.* Give municipalities a strong role in (a) selecting renovation buildings and (b) managing entire municipal renovation programs, including loan repayments by entities assigned on behalf of the owners of multi-apartment buildings—especially the least efficient buildings in terms of heating and energy consumption.
- *Involve and train project administrators and DH suppliers,* helping them to implement ESCO-type projects as was done under the Lithuanian EnerVizija model. ESCO-type partners can facilitate greater achievement of real savings. However, it should be done in close coordination with DH companies, which will need to produce and supply a lower amount of heat to the renovated buildings and make necessary investments on the heat production side.
- *Develop an energy consultants market* capable of producing energy audits, advising on investment plans, and supervising renovation works. Technical support can be provided to develop ways to prepare energy audits, perform cost-benefit analyses, and train energy consultants.
- *Develop a sufficient construction market* with contractors of relevant competence as well as a system for inspecting the quality of renovations. Contractors' and engineers' liability should be defined in law.

References

- Central Project Management Agency, the website of the JESSICA program:
<http://www.cpva.lt/lt/veikla/jessica-programa.html>.
- Europos socialiniai, teisiniai ir ekonominiai projektai (ESTEP). January 2009. *JESSICA Evaluation Study for Lithuania*. European Investment Bank (EIB).
<http://www.eib.org/attachments/li-evaluation-study.pdf>.
- Europos socialiniai, teisiniai ir ekonominiai projektai (ESTEP). April 2009. *Supplementary JESSICA Evaluation Study for Lithuania*. EIB.
<http://www.eib.org/attachments/documents/supplementary-study-on-JESSICA-instrument-for-energy-efficiency-in-lithuania.pdf>.
- Housing and Energy Saving Agency (HESA) (in Lithuanian, Būsto Energijos Taupymo Agentura, or BETA) website: <http://betalt.lt/lt/apie-programa>.
- Housing and Energy Saving Agency (HESA). *Stebėseną* (Monitoring).
<http://www.atnaujinkbusta.lt/index.php/lt/p/atnaujink-busta/apie-programa/stebesena>.
- Housing and Urban Development Agency website: <http://www.bkagentura.lt>.
- Lithuanian District Heating Association. “A step ahead from fossil fuel to renewable resources.”
http://www.lsta.lt/files/Leidiniai/LSTa_knyga_15/LSTA_galutinis_percent20variantas_2013-04-29.pdf.
- Lithuania Ministry of Environment. *Main Legal acts regulating renovation of multi-apartment buildings*. <http://www.am.lt/VI/index.php#/1596>.
- Lithuania Ministry of Environment and Housing and Urban Development Agency. 2011. *JESSICA in Lithuania: An Effort to Renovate Apartment Blocks*.” JESSICA Networking Platform, Brussels, 31 March.
http://ec.europa.eu/regional_policy/archive/funds/2007/jjj/doc/pdf/JESSICA/31032011_7_JESSICA_nwp_310311_lt_apartment_blocks.pdf.
- Monitoring report. 2011. “2010 metais atnaujintų (modernizuotų) daugiabučių namų atnaujinimo (modernizavimo) programos įgyvendinimo stebėseną.” UAB “Miesto renovacija.”
<http://www.am.lt/VI/index.php#a/11730>.

Annex A. Legal Framework

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

1. The *Civil Code of the Republic of Lithuania*. The Civil Code states that the maintenance and administration of multi-apartment 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.⁵² 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 2007.⁵³ 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).⁵⁴ According to the regulations,

⁵² <http://www.gbpn.org/databases-tools/bc-detail-pages/lithuania>.

⁵³ <http://www.buildingsdata.eu/results>.

⁵⁴ <http://www.pastatu-sertifikavimas.lt>.

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.⁵⁵ The certificates are available to the public on the online database.⁵⁶

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.⁵⁷ 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.

⁵⁵ <http://www.pastatu-sertifikavimas.lt/placiau.html>.

⁵⁶ For the database: <http://www.spsc.lt/cms>.

⁵⁷ *Implementation of the EPBD in Lithuania* (2012). <http://www.buildup.eu/publications/38188>.

Annex B. Lithuanian Energy Balance 2012

All amounts in terajoules

Energy balances	Total	Hard coal and lignite	Peat	Firewood, wood and agricultural waste	Biogas and liquid biofuel	Secondary solid fuel	Crude oil, other inputs to refineries	Natural gas	Renewable ⁵⁸	Petroleum products	Electricity	Heat
Production of primary energy	65216		709	41533	5088		4379		13507			
Imports	590537	8067		4623	1699	1724	387233	111200		45171	30820	
Exports	345768	580	153	4871	3614	228	3417			325913	6992	
Final consumption	202464	7698	275	28898	2668	1683		22946		68295	32115	37886
Industry	40215	4396	40	3406	52	592		11648		1153	10110	8818
Construction	1662	8		157				490		626	307	74
Transport	65905				2537			1130		61768	270	
Agriculture	455	18		496		21		1156		1994	644	226
Fishing	92									82	10	
Commercial and public services	25705	1305	112	1372	79	361		2652		202	11263	8356
Households	64330	1968	123	23467		709		5670		2470	20412	20412

Source: Statistics Lithuania, *Energy Balance* (2012).

⁵⁸ Hydropower, wind, solar, geothermal energy, and energy from chemical processes.

Annex C. Parameters of Lithuanian Housing Modernization Programs and Projects

Parameters	1st period (1996–2004)	2nd period (2005–10)	3rd period (2010–present)
Program	The Energy Efficiency/Housing Pilot Project 1996–2000 and post-project mechanism 2000–04	Multi-apartment Buildings Renovation Program	Multi-apartment Buildings Renovation Program through JESSICA with new model based on “EnerVizija” initiative ⁵⁹
Objectives	The project objectives were to provide credits for EE renovation of residential buildings and schools, and to deliver technical assistance.	This program implements the Lithuanian Housing strategy, whose objective is to ensure the effective use, maintenance, and modernization of housing and the efficient consumption of energy. The program seeks to renovate multi-apartment buildings built before 1993. Program objective until end of 2020: reduce heat (fuel) consumption in renovated buildings by not less than 20 percent, achieve annual heat savings of no less than 1000 GWh, and reduce CO ₂ annual emissions by not less than 230 thousand tons.	
Budget	Total: Lt 70 million	Total: Lt 325 million	Total: € 227 million
Source of funding loans	<ul style="list-style-type: none"> • US\$10 million credit line from World Bank; • US\$10.6 million revolving fund • US\$8.0 million (state budget grants) 	<ul style="list-style-type: none"> • Loans from Participating • Commercial Banks own resources; • State grants 	<ul style="list-style-type: none"> • €127 from EU Structural Funds (ERDF) • €100 from state budget resources
Source of funding subsidies	<ul style="list-style-type: none"> • State budget 	<ul style="list-style-type: none"> • State budget • Municipal grant for multi-apartment blocks renovation local programs (optional). 	<ul style="list-style-type: none"> • JESSICA HF • State budget • Special Program for Climate Change⁶⁰
Management of Funds	<ul style="list-style-type: none"> • Ministry of Finance; 	<ul style="list-style-type: none"> • Ministry of Environment; • Housing and Urban Development Agency (subsidies management) 	<ul style="list-style-type: none"> • Ministry of Finance as Managing Authority of Structural Instruments; • JESSICA Holding Fund managed by EIB;

⁵⁹ EnerVizija initiative

⁶⁰ Climate Change Programme is a special programmed aimed at financing measures aimed at managing climate change. Funding sources of Climate Change Programme are funds received for the sale of assigned amount units of greenhouse gases, green house gas emission allowance and other relates sources.

Parameters	1st period (1996–2004)	2nd period (2005–10)	3rd period (2010–present)
			<ul style="list-style-type: none"> Ministry of Environment as Intermediate Body of Structural Instruments; Housing Energy Savings Agency (subsidies management)
Financial intermediaries	Commercial Banks: AB Hermis bankas	Commercial Banks: <ul style="list-style-type: none"> AB SEB Vilniaus bankas, AB bankas SNORAS, AB Šiaulių bankas, AB PAREX bankas, AB SAMPO bankas, AB “Hansabankas” ir AB DnB NORD bankas 	Selected UDFs: <ul style="list-style-type: none"> (a) Commercial Banks <ul style="list-style-type: none"> AB Šiaulių bankas AB Swedbank AB SEB bankas (b) State owned institutions: <ul style="list-style-type: none"> VIPA/CPVA⁶¹
Implementing Agency	<ul style="list-style-type: none"> Public Institution Housing Credit Foundation (HCF) 	<ul style="list-style-type: none"> Budgetary organization Housing and Urban Development Agency (HUDA) 	<ul style="list-style-type: none"> HUDA until 2013; from 2013 Public Institution Housing Energy Saving Agency (HESA)⁶²
Project eligibility and selection criteria	<ul style="list-style-type: none"> Beneficiaries: HOA; Single Family Home Owners Majority of owners vote for modernization 50 percent plus one Energy audit and investment project assessment 	<ul style="list-style-type: none"> Beneficiaries: HOA; apartment owners (from 2009) Majority of owners vote for modernization 50 percent plus one⁶³ Constructed before 1993 implementation if C class⁶⁴ shall be achieved Investment Plan assessment 	<ul style="list-style-type: none"> Beneficiaries: Apartment owners represented by Administrator; Administrator of building acting in its own name but for the benefit of apartment owners⁶⁵; Municipal entity⁶⁶ Approved municipal program and selected buildings (optional)

⁶¹ From 2013.

⁶² HUDA was replaced by HESA from 2013.

⁶³ Some commercial banks require 100 percent of homeowner consent unless the loan is backed by a guarantee.

⁶⁴ According to Building Energy Performance Certificate classification.

⁶⁵ This option was available as of June 2012 following the amendment of the Law on State Support.

⁶⁶ This option was available as of January 2013 following the amendment of the Law on State Support.

Parameters	1st period (1996–2004)	2nd period (2005–10)	3rd period (2010–present)
		<ul style="list-style-type: none"> Current debts of apartment owners assessment 	introduced in 2013) <ul style="list-style-type: none"> Majority of owners vote for modernization 50 percent plus one⁶⁷ Constructed before 1993 at least Energy Efficiency Class D Investment Plan assessment Current debts of apartment owners assessment
Subsidy parameters	<ul style="list-style-type: none"> State grant of 30 percent of the loan principal but not exceeding US\$12.5 (Lt. 50) per m² of living area Low-income families could use existing heat subsidies to pay for a portion of the loan repayment 	<ul style="list-style-type: none"> 15–30 percent (2005–07) state support 15–30–50 percent (from 02.2007) depending on energy efficiency measures for energy efficiency measures implementation if C class⁶⁸ will be achieved 50 percent (until 03.2009) with limitation per square meter Technical documentation preparation and for expenses of supervision of works can receive 50 percent subsidy. 100 percent to low-income families support for investment repayment from heat subsidy 	<ul style="list-style-type: none"> 15 percent of total investment into energy-efficiency measures if at least class C achieved Additional 25 percent from Climate Change Program; Additional 15 percent in case of renovations in Zarasai, Ignalina, Visaginas municipalities under Ignalina Program⁶⁹ 100 percent of costs for technical documentation⁷⁰ 100 percent costs of project management costs 100 percent to low-income families support for investment repayment from heat subsidy

⁶⁷ At least 50 percent plus one; some financial intermediaries require 55 percent or 60 percent of the votes.

⁶⁸ According to Building Energy Performance Certificate classification.

⁶⁹ Ignalina Programme is EU financial instrument dedicated to support decommissioning of Ignalina Nuclear Power Plant and related measures in Lithuanian energy sector. Main part of the support is given to Ignalina Nuclear Power Plant and particular state institutions. Remaining part thereof may be distributed to municipalities situated in the Ignalina Nuclear Power Plant region.

⁷⁰ 50 percent of costs for technical documentation until 2013.

Parameters	1st period (1996–2004)	2nd period (2005–10)	3rd period (2010–present)
Loan parameters:			
• Interest	11 percent 8.5 percent (from 26-10-2014)	Variable VILIBOR/EURIBOR + ~1.5 percent margin or fixed	Fixed 3 percent p.a.
• Maturity	Up to 10 years	Up to 20–25 years	Up to 20 years
• Currency	Litas	Litas/Euro	Euro
• Down-payment	Minimum 10 percent which could be replaced by investment already made	Minimum 5 percent	Up to 5 percent of the project value from apartment owners
• Credit risk	<ul style="list-style-type: none"> Government assuming credit risk of the loans to HOA; Commercial banks bearing full credit risk for lending to owners of single family homes and individual apartments 	<ul style="list-style-type: none"> Credit can be insured in the state owned insurance company UAB “Busto pasklolu draudimas”; In some cases, banks do not require to insure credit, but instead 100 percent owners renovation decision Insurance fee depends on percentage of owners who took renovation decision: if 50–60% vote, the insurance fee is 0.52%; if 60–70% vote, the fee is 0.44%; if more than 70% vote, the fee is 0.37% 	Loan tied to the apartment, not the owner
Number of projects implemented or pipeline status for ongoing programs	<ul style="list-style-type: none"> 700 (multi-apartment buildings renovated) 25 (private building owners) 	<ul style="list-style-type: none"> 375 (multi-apartment buildings) 	<ul style="list-style-type: none"> 83 loan agreements ~€8.1 million (by 2013) During 2013 after approval of alternative ESCO type model: <ul style="list-style-type: none"> 1332 projects approved by HESA 917 project apartment owners took decisions 490 projects approved by UDF

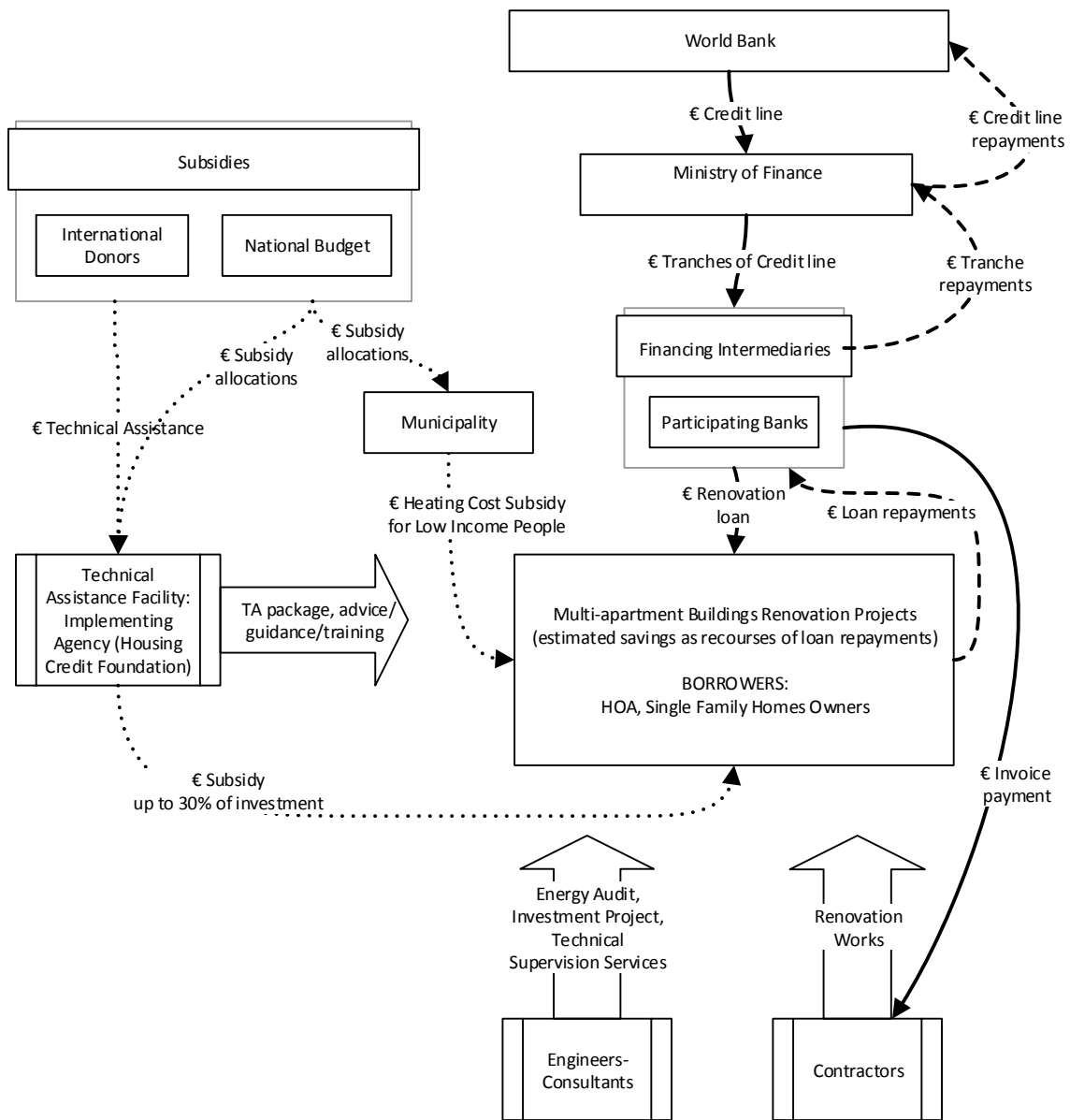
Parameters	1st period (1996–2004)	2nd period (2005–10)	3rd period (2010–present)
			<ul style="list-style-type: none"> • 322 projects started procurements • 194 projects started renovation works⁷¹ •
Average investments	<ul style="list-style-type: none"> • Loans averaged close to US\$1,000 per apartment and US\$31,500 per building 	<ul style="list-style-type: none"> • One multi-apartment building ~€290,000 (Lt. 1 million) • One apartment €5.800 (Lt 20,000)⁷² 	
Energy savings	<ul style="list-style-type: none"> • Decreased household energy consumption by 13–24 percent 	<ul style="list-style-type: none"> • Energy savings of 62–65 kWh/m² per year (~30–46 percent); • 82.25 GWh/year (8.22 percent of the Program objective of 1000 GWh year) 	
CO₂ reduction	N/A	<ul style="list-style-type: none"> • 20,880 tons/year (9.08 percent of the Program objective of 230,000 tons/year)⁷³ 	

⁷¹ Renovacija: kaip sekasi jūsų savivaldybei? <http://www.am.lt/VI/index.php#a/14046>

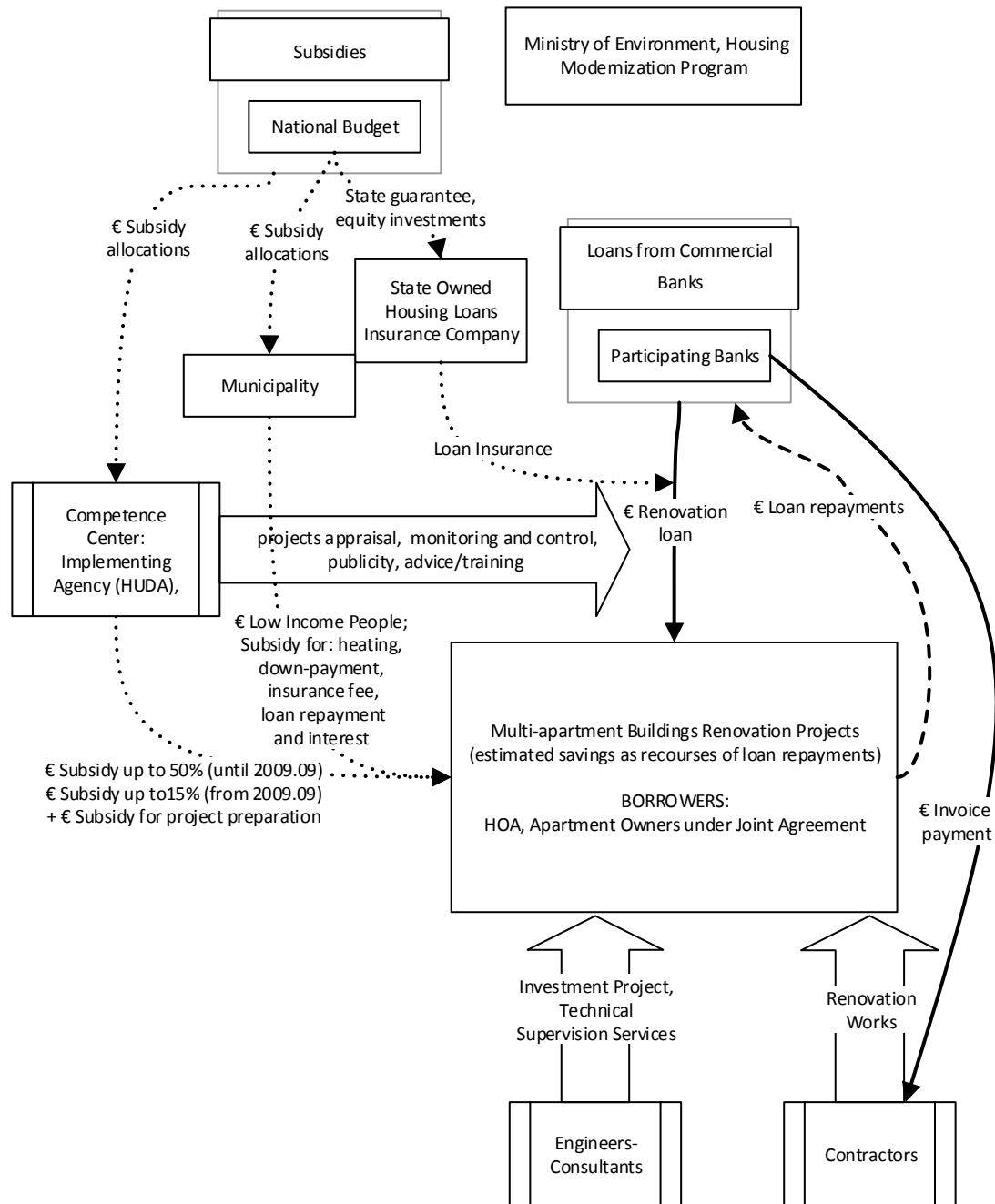
⁷² Based on projects implemented before 2103.

⁷³ Stebėsena (Monitoring) <http://www.atnaujinkbusta.lt/index.php/lt/p/atnaujink-busta/apie-programa/stebesena>

Annex D. The Energy Efficiency/Housing Pilot Project 1996–2004: Implementation Mechanism



Annex E. Multi-Apartment Buildings Renovation Program, 2005–10: Implementation Mechanism



Annex F. JESSICA: Implementation Mechanism

