[Lithuania] Renovation Programme with EU funding

Daugiabučių namų atnaujinimo (modernizavimo) programa, vykdoma gaunant dalinę ES finansinę paramą

About the measure

Policy instrument	Sector	Starting date and status
Financial incentives (grants, loans)	**Residential**	**2005 – 2020 ongoing**

There are more than 38,000 multi-apartment blocks in Lithuania. 66 % of population lives in multi-apartment buildings built before 1993. Total 24,000 blocks (70%) need to be refurbished, thus reducing heat consumption by 30%.

The Programme "Renovation (modernization) of multi-apartment blocks" was adopted in 2004 and launched in 2005, with the aim to renovate **the 4,000 most heat consuming multi-apartment blocks** (equivalent to about 120.000 dwelling units), and to implement 10,000 energy saving measures during 2005-2020.

The policy objective is to ensure the financing and implementation of projects for the renovation (upgrading) of multi-apartment buildings, by providing preferential loans and other state aid to owners of flats and other premises for implementing energy-saving actions. Another objective is to ensure that the residents receive information, education and training on matters of energy performance improvement and renovation (upgrading) of buildings.

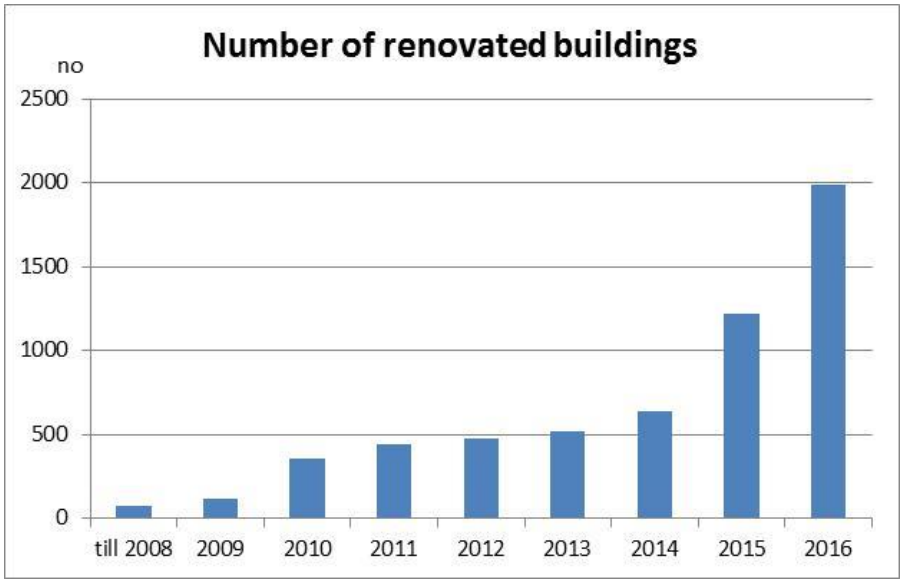
Municipalities evaluate and select multi-apartment buildings with the least energy efficiency in their territory and submit the information collected to the Ministry of the Environment (Supervisory authority for this scheme). An energy audit is conducted and an investment plan is drawn up for each building selected. Funds are borrowed by a programme administrator appointed by the municipality rather than flat owners, as is usually the case. The organization and quality of works as well as the future results are taken care of by the municipality (appointed program administrator). Multi-apartment residential buildings are eligible as soon as owners representing at least 51% of the flats approved the project.

A JESSICA initiative (EU financial scheme) was established in 2009 for funding of refurbishment of multi-apartment blocks constructed before 1993. The Jessica scheme in Lithuania is described in the annex to this case study, as well as the financial support provided and energy efficiency requirements. The scheme has been revised with new financial conditions from 2016 (see annex)

Expected energy savings in 2020	Benchmark
Final annual energy savings by the end of 2020 – 1,000 GWh	The objective of the programme is to renovate 4,000 multi-apartment blocks (120.000 dwelling units), to implement 10,000 energy saving measures during 2005-2020.

The EPATEE project has received funding from the European Union's Horizon 2020 Research and innovation programme under grant agreement No 746265.

Means and outputs



Source: SE Energy Agency (Lithuania)

Figure 1. Cumulated number of renovated buildings over 2005-2016

Renovation process under the Programme started in 2005. However, the activity get higher in 2010, with projects initiated just before the recession. The activity then slowed down due to the recession and increased again from 2014 and especially during years 2015 and 2016. Total cumulated number of renovated buildings over 2005-2016 was 1986 blocks (appr. 59,580 dwellings). In addition to renovation of residential buildings, 1280 education actions (seminars, trainings for flat owners and housing managers) on energy saving possibilities were implemented to residents of such buildings.

Total investment over 2005-2013 was about €368.5 million, including compensation for soft loan interest exceeding 3%; the costs of investment plan, energy certification before and after renovation, technical project, supervision and expertise and administration; the costs of the renovation works (material and labor costs) and for additional heating system adjustment.

The Housing Energy Efficiency Agency monitors the costs of the renovation projects and publishes average renovation costs per m². These costs were rather stable in recent years: €195/m² in 2017, €191/m² in 2016. The Agency reported that this stability is important for owners to be able to accurately assess the cost when considering a renovation project.

Data about energy savings

Unit	Main source of data
Cumulated final energy savings (GWh/y or GWh)	Data of the Housing Energy Efficiency Agency

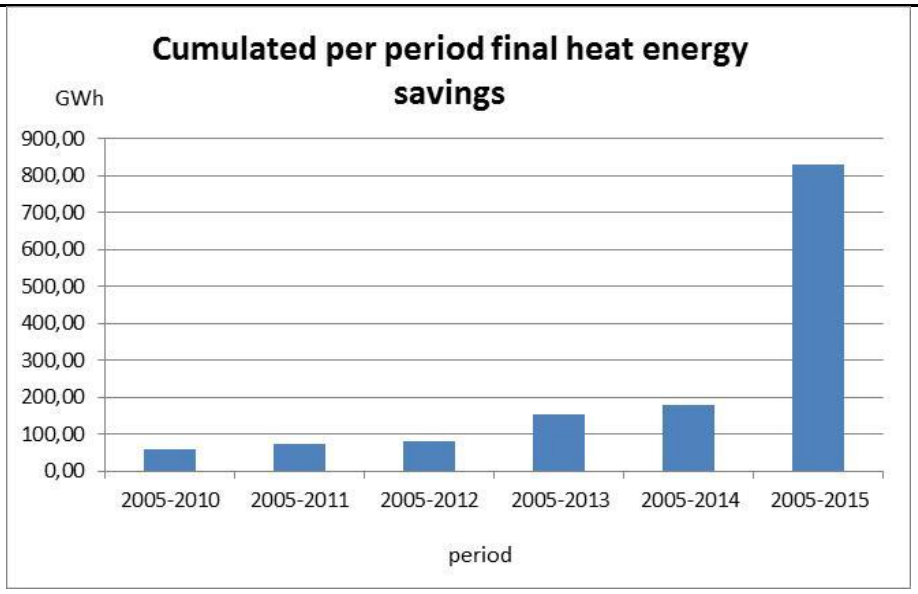


Figure 2. Cumulated final heating energy savings from year 2005 till a given year.

- **Cumulated final heating energy savings**: final heating energy savings from year 2005 till the date in the figure (828 GWh during 2005 - 2015).

This data was provided to the State Energy Agency by the Housing Energy Efficiency Agency, which evaluates and approves submitted investment plans and procurement documents and performs monitoring of renovated multi-apartment residential buildings on the basis of best estimate (see details below) of savings achieved from implemented actions. The estimate shows that average energy savings are at least 50% (vs. consumption before works).

In addition, the education actions made possible to achieve final energy savings of 47.57 GWh during 2005-2015.

Sources of uncertainties about energy savings

The best possible estimate corresponds to energy savings assessed via energy certification of the building before and after renovation works and energy audits performed before renovation.

The main uncertainties come from the fact that no measured data on energy consumption is used for energy audits for at least 3 years both, before and after renovation, to make data reliable. Besides, measurements of microclimate indicators (temperature, moisture content and CO2 concentration) were not defined before and after renovation for defining living standards inside renovated buildings.

Energy savings assessment in renovated buildings based on measured heating data, performed in one of Lithuanian cities disclosed actual energy savings of appr. 30% (based on measured data for a sample of about 50 buildings).

Evaluation of the energy savings

Calculation method(s) and key methodological choices

The final national energy savings are established by applying the "bottom-up" approach taking into consideration energy savings of each refurbishment project. The Calculation Rules are defined in the "Rules for calculating national energy savings", approved by Order No 1-320 of the Minister for Energy (05 December 2016). The provisions of these calculation rules for national energy savings apply when calculating national energy savings and drawing up energy efficiency action plans in accordance with the requirements of Article 14 of Directive 2006/32/EC.

- For calculation of the energy savings in residential buildings after renovation works, the **scaled savings** calculation method is used, on the basis of nationally established methodologies and benchmarks. Energy consumption before and after renovation is calculated using the methodology defined for the energy certification for buildings using software tool NRG3, which assesses energy consumption of buildings in detail (**method 5**).
- The **baseline** is defined as the theoretical energy consumption before the renovation works (**actual before**). Theoretical energy consumption corresponds to energy consumption estimated according to the energy certification methodology, i.e. assuming standardized heating behaviours and weather conditions.
- **No adjustment** (rebound effect, free-rider effect, etc.) is applied. So the results are **gross** energy savings.
- The calculation method takes into account the **lifetime** of energy savings. When reporting results for the EED, this may be done by counting the savings that each individual action will achieve between its implementation date and 31 December 2020.

Ex-post verifications and evaluations

An Energy Efficiency Law (EEL) was elaborated and adopted on November 3, 2016. It defines the policy measures to implement the Energy Efficiency Directive (EED, 2012/27/EU), as well as the roles and responsibilities about monitoring and energy savings calculations (see *Experience feedback from stakeholders*).

Upon completing the implementation of energy efficiency actions, persons receiving financial support from programs register the entity's indicators (heat consumption in kWh/m^2 per year) during the same calendar year and for one calendar year afterwards and then transmit the data collected to the administrator of the respective program.

This monitoring should make possible to collect the following data: type and number of actions implemented, energy properties of the actions, amount of investment for each action. It is relevant to program administrators who evaluate individual indicators, review the monitoring exercise, make the forecast and file the monitoring report on efficient consumption of energy for the previous calendar year to the Ministry of Energy.

For some selected residential buildings, ex-post monitoring (or energy efficiency audits) on implemented actions and energy savings is performed. Assessment shows that passive energy saving actions (wall, roof insulation) give the largest impact to total energy savings.

The costs of evaluation are not available, since tender results are confidential commercial information.

Other indicators monitored and/or evaluated

Indicator	Explanations
Average actual indoor air temperature	Measured during certain time period (e.g.one week).
Average actual relative moisture content.	Measured during certain time period (e.g. one week).
U_f for outside walls	U_f: heat transfer coefficient after renovation, W/m^{2}K Measured and compared with values defined in the project
U_f for window glazing and frames	U_f: heat transfer coefficient after renovation, W/m^{2}K Measured and compared with values defined in the project
CO_2 concentrations	Measured during certain time period (e.g.one week).

Above indicators are selected by specific auditors for selected projects (see for example: UAB Projektų rengimo centras, 2017) and might not be assessed in other cases.

Other aspects evaluated

All performed evaluations involve mainly technical aspects of buildings renovation. Policy assessment was performed by one single research of student master studies (Ropaite, 2012). This research aimed at identifying the main barriers to the renovation of apartment blocks and suggest recommendations to overcome them, based on a review of experiences in other countries.

A recent survey done by Spinter Research for the Housing Energy Efficiency Agency investigated the satisfaction of flat owners and residents at least one year after renovation works. Though the majority of respondents consider the quality of their home to be “very good” or “good”, assessed their apartment status positively, still there were some negative responses. When asked about whether the renovation met their expectations, some respondents were satisfied with the lower heating costs, some agreed that dwelling became more comfortable, however there were also some dissatisfaction due to poorly executed works or other defects, also expensive price. According to the agency, the results of the survey thus showed that the current system of maintenance and control of the renovation quality ensures proper management of the quality of apartment renovation processes.

National Audit Report on the Programme for renovating (upgrading) multi-apartment buildings was prepared for the initial stage of renovation process in 2010 (Lietuvos Respublikos Valstybes Kontrole, 2010). Its main results and conclusions were:

1. Implementation rate of the Programme “Renovation (modernization) of multi-apartment blocks” was insufficient in terms of reaching defined goal due to the following reasons: slow support for prepared projects due to slow adjustment of financing mechanism; economic assessment criteria do not allow to evaluate economic effect of energy saving measures; the aim to reduce heat consumption by 30% is too low as modern energy saving actions and technologies allow saving larger potential.
2. Preliminary assessment disclosed that residents have implemented some energy saving actions on their own account, which improved possibilities to achieve the obligations to EU. However, there is risk that these possibilities will be not as effective as possible due to lack of regulation of heat supply in all buildings and consumption in some apartments with regard to energy needs thus protecting consumers from unjustified over-supply of heat on the initiative of its suppliers.

3. Residents understand the importance of renovation, however, they did not receive reliable data on technical and economic results of renovation, which increased their distrust in the process. There was need to define clear indicators to evaluate the effectiveness of investment, energy performance certification before and after renovation does not provide justified information on actions to be implemented using support. Energy audits were not comprehensive and often of low quality, they did not provide data for correct assessment of modernization results. Supervision of existing project stages (design, construction work, technical monitoring and control) was insufficient. Energy tariff may increase after renovation, however, residents were not informed that this may be compensated by reduced heat consumption.
4. State support order was not directly dependent on saved heat and did not encourage residents investing in more efficient but also more expensive energy saving actions. There are no possibilities to implement actions in stages. Repayment of financial losses is not guaranteed in case planned energy saving indicators are not achieved.

After such rather negative assessment, some lessons were learnt and corrective measures were taken after 2007-2013 renovation period:

- Municipalities were instructed to draw list of the worst-performing buildings;
- Municipalities have appointed renovation administrators;
- Administrators borrow on behalf and for the need of apartment owners;
- Loan remains off balance sheet for Administrator; and
- Amendments to the legal basis related to heating bill compensations were adopted on 1 June 2013: where a community decides to renovate the multi-apartment block, those low income families who have declined participation in the decision-making process would receive 50% smaller compensation for the heating bills during the proximate heating season and no compensation from the next heating season until the block renovation project is completed but no longer than 3 years.

Focus on the evaluation practices

A review was made to investigate existing reports on energy efficiency policy in building sector. The study showed that the number of such reports is very limited.

One of the main reports (World Bank Group, 2014) analysed for this case study, summarizes key lessons learned, and relevant recommendations for the buildings renovation process in Lithuania:

- 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 for multi-apartment building 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 Housing Owners Association (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 percent) 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.

Comparison of actual (measured) energy (heat and electricity) demand after renovation project implemented with scaled savings calculated with building certification software tool is one of tasks for refining future evaluation process. Nevertheless, such comparison of measured and calculated energy data for specific building is complicated because of:

- Building energy demand depends on climate conditions of investigated period. Calculations are based on climate conditions of reference year. Correction of measured data is necessary for heat demand of space heating.
- There are no data records on inside climate conditions before renovation. Higher temperatures are observed in premises after renovation, however exact figures are not known.
- Building owners, as they declare themselves, having lower energy bills after renovation, can consider higher comfort as affordable thus increasing inside temperature from “normal” 20-21 °C to 22-24 °C. This will diminish energy savings in renovated houses.
- Evaluation uncertainties caused by above reasons can’t be avoided even by conducting energy audits after renovation. Energy audits, however, can provide very useful information on renovation quality. Therefore such audits could be recommended on a case to case basis.
- So far there is one example of comparison of measured data before and after renovation of buildings in Kaunas town heated by DH (District Heating) system (sample: 80 buildings equivalent to 2,400 dwellings). The investigation was made by LEI researches and presented in International conference, showing variety of energy saving results and costs of saved energy. The main conclusions are:
    - For proper assessment of the renovation quality, one needs not only to perform certification of the buildings but also energy audit before renovation and after. Audits should assess the quality of building envelope, heating and ventilating systems, as well as microclimate parameters.
    - Total actual measured heat demand in renovated buildings decreased by 32% only. On the other hand, rehabilitation of systems for domestic hot water in buildings does not add much to total energy performance of the building.
    - Energy savings for space heating versus total building heated area shows that there is no correlation between building area and relative energy savings. Moreover, in big buildings exceeding 4,000 m^2 energy savings per unit of heated area might be even less than for those in small and mid-size buildings.
    - Though it is expected that a big variety of possibilities for energy performance improvement should exist in non-efficient buildings, nevertheless, there is a weak correlation between energy savings and heat demand before renovation and no correlation is observed in case heat savings are expressed as percentage from heat demand before renovation.
    - Despite widely scattered amount of investment between 10 €/m^2 and 300 €/m^2, and expectation that relative investment per square meter for smaller buildings is higher than in big buildings, the data assessed proves this relationship, however, there is no correlation between saved energy and investment.
    - Economic effect discloses that the cost of saved energy in most cases is higher than heat price, and higher relative investments needed in smaller houses result in higher cost of saved energy.

Experience feedback from stakeholders

The interviews with the main stakeholders in Lithuania - Ministry of Energy and State Enterprise Energy Agency were carried out, discussions on results of case study has been made.

1. **What are the main national documents for the implementation of the energy efficiency policy in Lithuania?**

The main national documents are:

- National Energy Independence Strategy (approved in 2012).
- Lithuanian Energy Efficiency Action Plan 2014 (approved by Order No 1-149 of the Minister for Energy, 30 May 2014).
- Energy Efficiency Law (approved 03 November 2016. No XII-2702).

The strategic initiatives of the National Energy Independence Strategy are to increase total energy consumption efficiency by 1,5% annually until 2020.

2. **What is the role of evaluation in the management of the scheme?**

According to the law, the Ministry of Energy is responsible for the overall implementation, monitoring and verification of the energy efficiency policy in Lithuania.

The State enterprise Energy Agency is responsible for estimating energy savings on the national level. The monitoring process involves persons receiving financial support from programs, the public authorities or bodies administrating programs implemented by the public authorities and the Ministry of Energy.

The main document about monitoring is the "Rules for monitoring efficient consumption of energy resources and energy", approved by resolution No 332 of the Government (30 March 2016).

The Monitoring Rules set out the monitoring requirements to buildings, technological processes, installations or transport units covered by energy efficiency improvement measures and receiving financial support from energy efficiency improvement programs implemented by the public authorities.

3. **What are the usual evaluation practices in Lithuania?**

Typically the following evaluation is implemented for the energy efficiency policies in Lithuania:

- Ex-ante evaluation is performed mainly as some technical evaluation for specific measures
- Ex-post evaluation is performed partly and not for real lifetime of energy efficiency measure

Considering effectiveness of policy evaluation in Lithuania evaluation is in place at least for the most important policies, but it is not sufficiently developed to produce improvements in the analyzed measures

4. **What were the lessons learnt in terms of evaluation practices?**

The main barriers to policy evaluation in Lithuania are as follows: lack of reliable data on energy savings; partly lack of reliable data on investment costs that benefit from incentives; lack of reliable data on side effects such as employment, market development, qualification of operators, etc.; lack of policy evaluation culture; insufficient economic resources available for policy evaluation; policy evaluation is extended only on some policies in small scale; policy evaluation techniques and procedures are not sufficiently known; lack of standardized evaluation procedures; lack of widespread effectiveness indicators; lack of communication/cooperation among institutional bodies; and lack of an obligation to enforce policy evaluation on each policy measure.

5. **In parallel of the ex-post evaluations, are there other evaluations or studies that provided insights about the impacts of the scheme and/or possible interactions with other policies or drivers (or barriers) for energy efficiency?**

There are very few studies due to above mentioned lack of reliable data.

To go further

About the measure

- Website of the Renovation Programme (in Lithuanian):

http://atnaujinkbusta.lt/beta-direktorius-v-serbenta-pvm-lengvata-sildymui-suteikia-gyventojams-galimybe-investuoti-i-renovacija/
http://atnaujinkbusta.lt/daugiabuciu-renovacija-rangos-darbu-kaina-stabili-jau-kelerius-metus/
http://atnaujinkbusta.lt/tyrimas-didzioji-dalis-atnaujintu-daugiabuciu-gyventoju-teigiamai-vertina-renovacijos-kokybe/

- Energy Efficiency Action Plan 2014. Lithuania.

https://ec.europa.eu/energy/sites/ener/files/documents/2014_neeap_en_lithuania.pdf

- The Decree of the Republic of Lithuania on adoption of the Programme for renovating (upgrading) multi-apartment buildings no 1213, Sept. 23, 2004 (actual version March 23, 2017) (Lithuanian):

https://www.e-tar.lt/portal/lt/legalAct/TAR.AE67B6739526/pwvtiEWtqZ

- Description of the measure in the MURE database:

http://www.measures-odyssee-mure.eu/public/mure_pdf/household/LT8.PDF

- ODYSSEE-MURE, 2014. Energy Efficiency Trends. Energy Efficiency Country Profile: Lithuania. December 2014:

http://www.odyssee-mure.eu/publications/profiles/

- ODYSSEE-MURE. Energy Efficiency Trends for Households in the EU.

http://www.odyssee-mure.eu/publications/efficiency-by-sector/household/

References of the evaluation(s)

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https://www.vkontrole.lt/failas.aspx?id=2243

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http://documents.worldbank.org/curated/en/219131468101065684/pdf/893220WP0P133200000200140006016018-42.pdf

Other useful references

- Kveselis, V., Dzenajaviciene, E.F., Lisauskas, A., 2017. Effectiveness of Residential Buildings Renovation on the Example of Kaunas City. Proceedings of the 10th International Conference "Environmental Engineering", Vilnius Gediminas Technical University, Lithuania. 27-28 April, 2017.

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- Dagiliute, R., Luizyte, S., 2011. Blockhouse Renovation: Some Insights from Pilot Survey of Households in Kaunas City. Proceedings of the 8th International Conference "Environmental Engineering", May 19–20, 2011, Vilnius, Lithuania

http://leidykla.vgtu.lt/conferences/Enviro2011/Articles/3/735-739_Dagiliute_Luizyte.pdf

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https://vb.vgtu.lt/object/elaba:2023478/2023478.pdf

- Housing Energy Efficiency Agency, 2013. Programme for renovating (upgrading) multi-apartment buildings. Presentation of the Housing Energy Efficiency Agency on the revisions in new model (in Lithuanian).

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- Kazlauskaitė, A., Bumelytė, J., 2016. Financial instruments for energy efficiency in the programming period 2014-2020. Financial instruments in Energy Efficiency in Lithuania. 2016.

https://www.fi-compass.eu/sites/default/files/publications/presentation_20161020_vienne_agne_kazlauskaite_1.pdf

- Financing Renovations. Vilius Bernatonis. Vilnius, 10 November 2015. (confidential)

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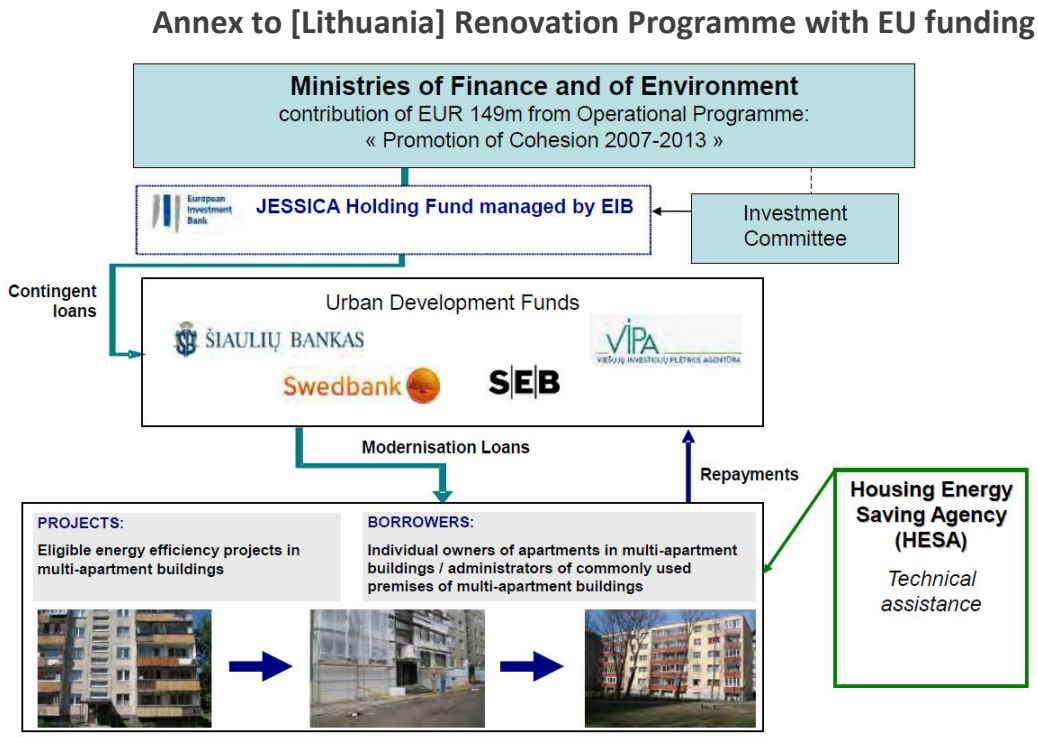

Figure 3. Scheme of Financial Model Jessica (Kazlauskaitė and Bumelytė, 2016).

The financial support offered by the scheme covers:

- 100% grant of Jessica loan for preparing documents (investment projects, technical project, supervision, etc.)
- 45% loan rebate if a minimum energy efficiency level is met (20% reduction for D level + 25% from Climate Change Program (CCP))
- Exceptional 100% subsidy on all expenses for low income persons.

The loans can have a duration up to 20 years, with interest rate fixed for entire loan period at 3% p.a. Bank may require a down payment not more than 5%. No loan insurance is required. Grace period can be up to 2 years during the period of works.

The scheme has been revised in 2015 and new financial conditions are applied (JESSICA2):

- 40% loan rebate if a minimum energy efficiency level is met (15% reduction for C level + 25% from CCP) during 2015-2017; and
- 35% loan rebate if a minimum energy efficiency level is met (15% reduction for B level + 20% from CCP) since 2018.

The financial plans for the refurbishment projects are designed so that the loan repayments can be done thanks to the savings on the energy bills, as shown in the figure below.

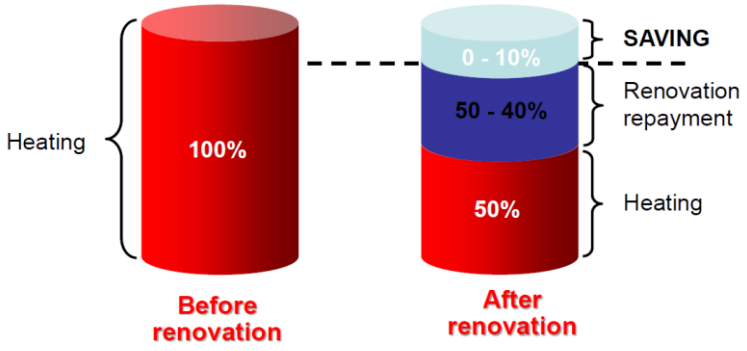

Figure 4. Design of the financial plans for refurbishment projects.