Master Plan

for innovative energy structures in
***Limbaži Region in Latvia**,*
which could be feasible for funding in the
Structural Funds Programmes in the period 2007- 2013

Energy 4 Cohesion - Deliverable 4.6

Elaborated by Ekodoma, Ltd.

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Executive Summary

The elaborated Master Plan is a planning document, which is developed to promote sustainable energy management in Latvian target region – Limbaži region. This Master Plan aims at undertaking actions to increase the utilization of locally available renewable energy sources and potential of energy savings, thus promoting region's energy self sufficiency and taking in mind sustainability of energy production and end use.

In Chapter 1 the Introduction is given, describing the background, objectives and methodology of Master Plan development.

In the next step (in Chapter 2) Limbaži region portrait has been described. The description includes the general context of the region – geographical setting, natural and climate conditions, description of the administrative structure, demography, building stock etc. In this chapter also current energy situation is described and potential for renewable energy sources (RES) and energy efficiency (RUE) is analyzed. This investigation was based on available statistical data; existing planning documents as well as on interviews with local stakeholders. The investigation of existing energy situation showed that almost all electricity consumed in region is imported from outside and Limbaži region fully depends on other regions.

To promote the energy self-sufficiency and sustainability of energy production and use, energy saving and RES potential has been identified. The investigation showed that the biggest energy saving potential is in housing sector and most significant RES potential is for wind energy and biomass projects. In this chapter available RUE/RES options in the region were identified. Identified options include solar energy projects, wood log boiler replacement with pellet and wood chip boilers, wind energy projects, biomass cogeneration plants and energy efficiency projects in buildings and district heating systems.

Based on the investigation of existing energy situation, energy vision for Limbaži region has been developed (see Chapter 3). The global objective of energy vision is to provide future energy supply and improved energy management in line with sustainable development principles, by enabling dynamic development of the Limbaži region. The global objective is based on three key objectives:

- Reliable, available and diversified energy supply, maximal use of locally available resources;
- Effective, well planned and managed energy production and consumption;

- Reduction of current pollutants and CO_2 emissions from fuel combustion and improvement of ambient air quality.

Based on the objectives of energy vision, 6 priorities were set up. Additionally 6 energy actions suitable for Structural Funding in 2007 – 2013 were identified. After discussions with local stakeholders 4 energy actions were chosen and elaborated in more detail in Chapter 4.

Each energy action or bundle of actions where analyzed in six steps.

In step 1 the technical pre-feasibility has been described. Step 2 included the description of actions energy balance. In step 3 the financing concept with financial engineering and short economic analysis has been developed. In step 4 to step 6 positive effects in view to overall energy vision has been described, as well cooperation scheme and strategy for financing the energy action have been elaborated. In Chapter 4 the following energy actions/action bundles (pilot projects) were selected and further developed:

- Action 1. Fuel switching and installation of solar collectors in Salacgrīva city;
- Action 2. Biomass CHP in Limbaži city;
- Action 3. Renovation of district heating network in Umurga village;
- Action 4. Energy efficiency measures in multi-apartment buildings in Ainaži city.

In Chapter 5 some overall conclusions and future recommendations for energy development in Limbaži region have been included.

Content

1. Introduction

1.1 Background

Regional focus

The Master Plans presented with this report has been developed in the scope of the **Energy 4 Cohesion (E4C)** project, funded under the Intelligent Energy for Europe (IEE) Program. E4C strives to prepare the ground for the extended use of Structural Funds for innovative renewable energy actions in rural regions of Europe which make use of the regional renewable energy potential and increase the energy efficiency. The European social **cohesion** requires a balance in the economic and social conditions in all European regions. **Energy** can play a major role in achieving this balance. The availability of cheap and reliable energy contributes to sustainable social and economic development. Moreover, the exploitation of the own energy resources of a region means to bring additional employment knowledge and investment into the region which otherwise would be dragged into the more developed municipal regions.

In view to this regional approach the eight E4C target regions are the focus of all project related strategy and planning efforts. These regions have been selected for their suitability for extended use of renewable energies and energy efficiency actions, namely:

- Rich resources for renewable energy generation particularly biomass resource
- Clear support of the political and administrative decision makers
- Availability of an extended knowledge and data basis for the planning process.

Based on these requirements the following target regions have been selected:

1. **Czech Republic: Zlin Region**
2. **Estonia: Saaremaa Island**
3. **Greece: Prefecture of Evros**
4. **Italy: Alta Locride**
5. **Latvia: Limbazi Region**
6. **Lithuania: Kaunas Region**
7. **Poland: Poviat Nowa Sol**
8. **Slovak Republic: Velky Krtis**

Cooperative Approach

In each target regions all main stakeholders have been brought together for a successful and efficient definition of innovative energy actions in the respective region. The E4C actor cycle includes municipalities, households, media, capital provider and financial experts. Within this actor cycle he E4C consortium partners were responsible for the coordination of the different actors, and the preparation of the regional **Master Plans**. Main focus was put to integrate suggestions and ideas existing in the region rather than exposing priorities from outside.

Action focused strategy

Comprehensive investigations were undertaken, starting from an abstract and general view on the regions, leading to concrete innovative energy set-ups, consisting of a range of RE and EE actions. A comprehensive and detailed methodology was developed within E4C, which is illustrated in chapter 1.3 of this report.

Targeted towards Structural Fund Support

The cornerstone of the E4C – strategy is to support the implementation of energy pilot actions in the selected regions feasible for public financial support, with main focus on **European Structural and Cohesion Funds (SF and CF)** during the funding period from 2007-2013. The main focus during the current programming period of SF and CF lies on the Lisbon Criteria. This reflects the ambition of the EC to reach greater sustainability, more employment and increased economic growth, targets that were set in the Lisbon Agenda. As stated above, renewable energies can contribute to these targets; moreover they increase the competitiveness of communities and regions, and foster European cohesion. However, up to date in most countries of Eastern and Southern Europe, only a small percentage of SF and CF measures have been dedicated to RE and EE projects. E4C strives to overcome the various constraints which currently hinder the broader use of Structural Funds for innovative energy actions in less developed and rural regions of Europe.

Conclusions

With the finalization of the Master Plans the core milestone of Energy 4 Cohesion has been accomplished. The large efforts undertaken by the respective partners in the regions have resulted in the selection of highly feasible and sustainable project ideas. The intense work for the Master Plans also has stimulated the interest and support of the local and regional decision makers for these results.

1.2 Objectives

The general objective of this Master Plan is the implementation of efficient and sustainable energy management policy in Limbaži Region in Latvia. This Master Plan aims at undertaking actions to increase the utilisation of locally available renewable energy sources and potential of energy savings, thus promoting region's energy self sufficiency and taking in mind sustainability of energy production and end use.

Global objective of the Regional Energy Plan of Limbaži region is dynamic development of the region by providing future sustainable energy supply and improved energy management.

Based on the global objective, three specific objectives of this Master Plan were formulated:

1) Reliable, available and diversified energy supply, maximal use of locally available resources;
2) Effective, well planned and managed energy production as well as energy consumption;
3) Reduction of current pollutants and CO_2 emissions form fuel combustion and improvement of ambient air quality.

Based on the specific objectives, six key priorities were defined:

1) Efficient use of energy in both new and existing buildings, including sustainable land planning;
2) Efficient production of heat and electricity;
3) Increased use of renewable energy;
4) Education and awareness, promotion of local actions;
5) Funds raising for modernization of energy supply infrastructure and efficient use of energy;
6) Efficient energy management and cooperation of regional administration, municipalities and private sector.

The Master Plan is focused on implementation of concrete sustainable energy related projects. It is desirable that the proposed projects will be carried out with particular focus on possibilities of financing these actions from EU funds available in the programming period of 2007 – 2013 in Latvia.

1.3 Methodology of Master Plan Development

This Master Plan is elaborated based on a methodology, which was elaborated within Task 3.2 of the Energy 4 Cohesion project. The aim of the methodology is to facilitate the decentralized energy actions planning in 8 Target regions within the context of European Cohesion Policies. The methodology presented on next page (Figure 1.1) should ensure that:

- The results of the Target region planning can be compared;
- The coordination work for the many regions is supported with a strong tool;
- The local partners find help and guidance for assessing their potential and defining suitable renewable energy and energy efficiency actions.

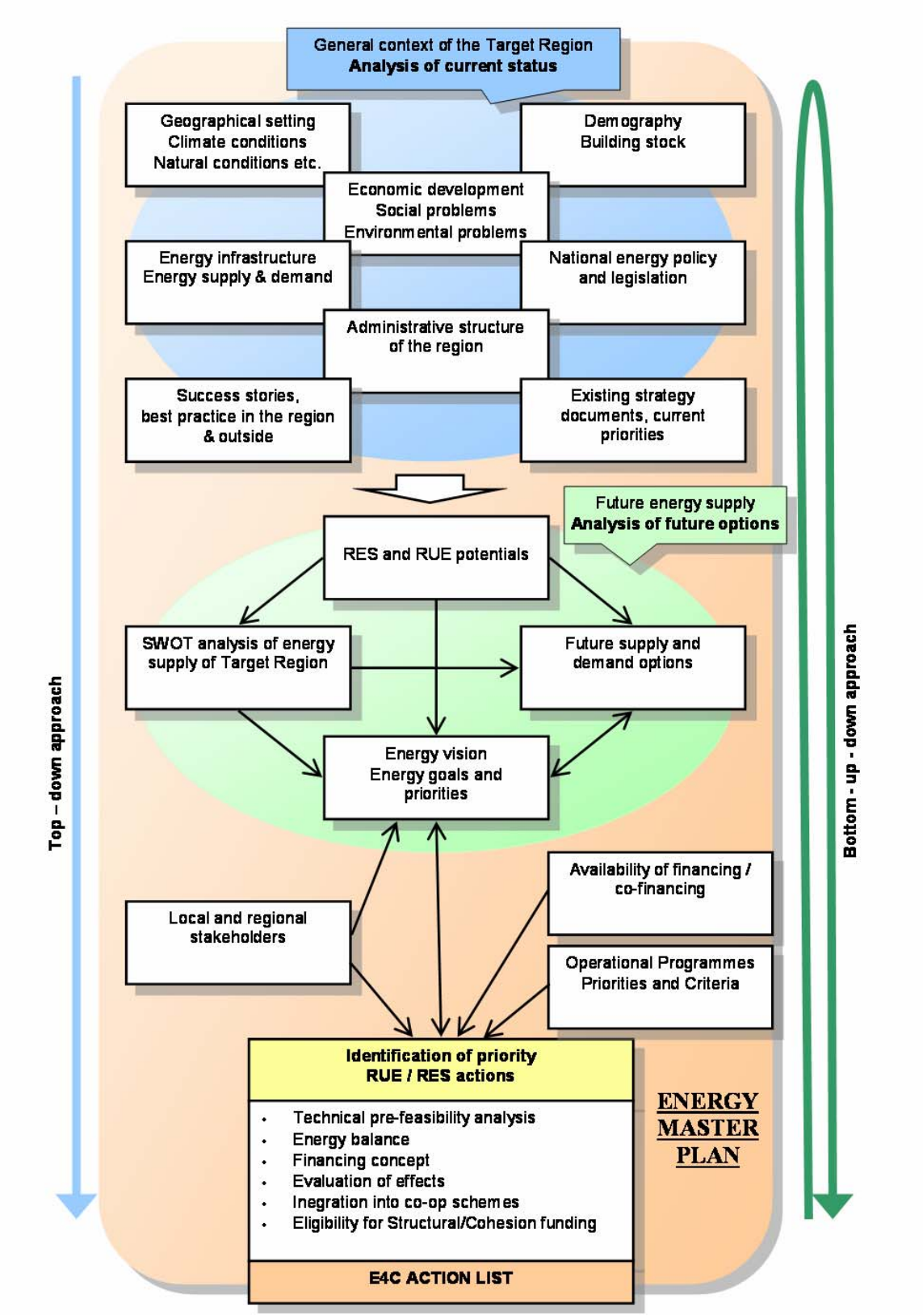


Figure 1.1: Methodology for elaboration of Master Plan

2. Target Region Portrait

2.1 Description of general context of the region

2.1.1 Geographical setting, natural conditions, climate, historical context

Limbaži region is located in Northern part of Latvia, near the Riga Gulf and borders with Riga region, Cēsis region, Valmiera region and Estonia on North (see *Figure 2.1*).

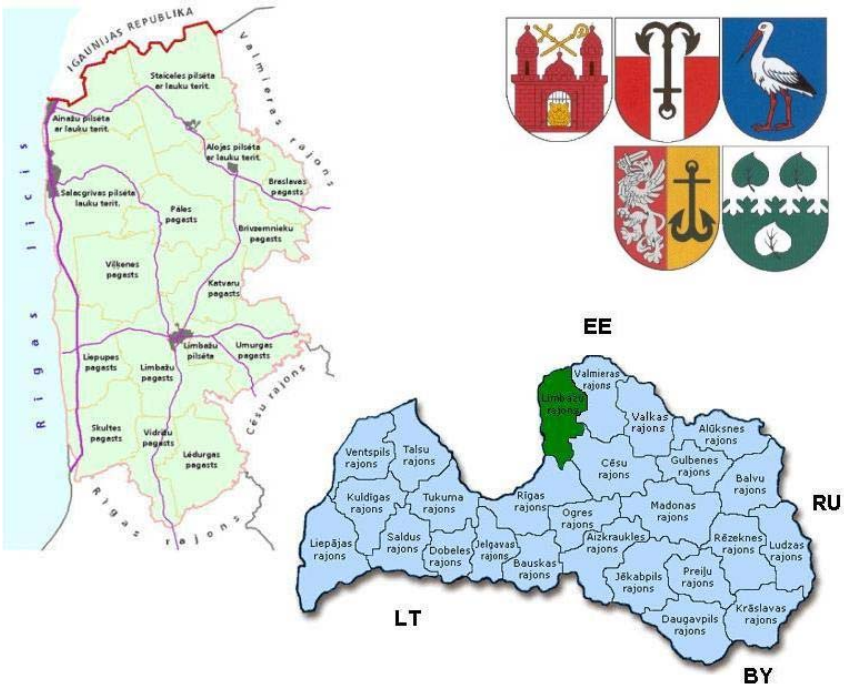


Figure 2.1: Location of Limbaži region in Latvia

Geographical situation of Limbaži region has substantially affected existing energy infrastructure. Since Limbaži region is located on the see shore, there are several see-ports (e.g., Skulte, Salacgrīva) where regular export flows including fuel (basically wood-fuel) are going through the region. Round timber, saw timber, wood-chips, firewood and peat are exported through Skulte sea-port. Salacgrīva port is a commercial port where the main cargo exported is timber and as well wood-chips and peat. Approximately 30% of peat cargos are imported from Estonia.

2.1.2 Administrative structure of the Region

Limbaži region includes 11 civil parishes and 5 towns, 4 of which have their rural territories. Since 1967, when the region was founded, it has its present day territorial formation. The centre of the region is town Limbaži with total area 8,994 km^2 and 8549 inhabitants.

Each civil parish and town has self-government (municipality). Some of the municipality main permanent functions include:

- To organize municipal services to the inhabitants;
- To be responsible for the improvement of and sanitary condition of their administrative territory;
- To be responsible for the educations of the inhabitants leaving in the territory;
- To guarantee the availability of health care and to promote a healthy lifestyle;
- To give housing support to inhabitants;
- To encourage business activity in their administrative territory and to take measures to decrease unemployment;
- To issue permits and licenses for entrepreneurial activity;
- To set the order of construction works in compliance with the development plans of their respective administrative territories;
- To monitor building activity in their respective administrative territories;
- To collect and issue data required for national statistics;
- To organize public transport services;
- Etc.

The permanent functions of regional governments are described in the “Law on Self-Government”. The regional permanent functions are very limited, but most of the districts perform a considerable number of voluntary tasks and, to some extent, support weaker local government with implementation of their tasks.

2.1.3 Demography and the building stock

Limbaži region is populated by 38012 people (data on beginning of 2006). From them 43.9 % live in the towns and 56.1 % in countryside. The total floor space of Limbaži region housing stock is increasing every year. Changes in building stock from 2000 – 2005 are shown in *Figure 2.2*.

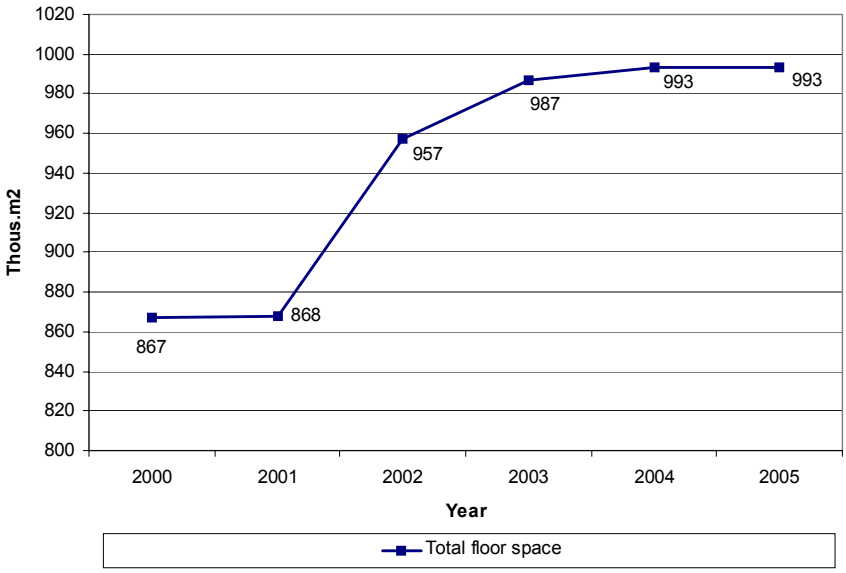


Fig.2.2: Changes in building stock in Limbaži region

Data source: Central Statistical Bureau of Latvia

Total number of multi-apartment buildings is about 270 and there are about 120 public buildings.

2.1.4 Other important information about the region

The population in Limbaži region is decreasing every year. The main reasons are the high death and emigration rates. In 2005, 40.7% from total employees were employed in the public sector, 59.3% - in the private sector. The unemployment rate is comparatively low, at 6.9% in July 2007.

Key environmental problems defined during the interviews with local stakeholders are related to water quality and waste water treatment. However, these problems in 2005 – 2007 were approached with support from EU Cohesion Fund. Additional support for those projects will be provided as well in the next planning period in 2007 – 2013.

Limbaži region is included in Riga planning region. The Development Program of Riga Planning Region for 2005 – 2011 was elaborated in 2004. In the beginning of 2007 the new Territory plan of Riga region was developed as well the particular territory plan for Limbaži region is under the public discussion. One significant part of Limbaži region Territory Plan is the review on region's environmental situation.

Information and planning related to energy and environmental aspects is partly included in those existing planning documents. However, specific Energy plans or Energy Action plans for regional level are not available.

2.2 Current energy situation

There are different energy sources used in Limbaži region. Heat is produced in district heating systems, local heat sources and individual heating systems. Table 2.1 gives the overview of largest heat sources in Limbaži region, their installed capacity and fuel used.

Table 2.1. Overview of largest heat sources in Limbaži region

Nr.	Location	Name, owner	Installed capacity, MW	Fuel used			
				Wood	Coal	Light fuel oil	Heavy fuel oil
1.	Salacgrīva city	JSC "Brīvais Vilnis"	30.69	+			+
2.	Limbaži city	Limbaži district heating company boiler house Cēsu Street 31	12.5	+		+	+
3.	Limbaži city	Limbaži district heating company boiler house Jaunatnes Street 6	6.58	+		+	
4.	Brīvzemnieki parish	Ozoli vocational secondary school	3.5	+			
5.	Salacgrīva city	JSC "Grīva"	3.0	+			
6.	Vidriži parish	Frip, Ltd.	3.0	+			
7.	Limbaži city	Dairy processing plant “Limbažu Piens”	2.68	+			+
8.	Limbaži city	Limbažu ceļi, Ltd.	1.9	+			+
9.	Aloja rural territory	Aloja Starkelsen	1.7			+	
10.	Limbaži city	Limbaži 18.th vocational secondary school	1.6	+	+		
11.	Liepupe parish	Liepupe municipality	1.5	+	+		
12.	Aloja city	Aloja utility company boiler house	1.5	+			
13.	Ainaži city	Hospital "Ainaži"	1.4	+			
14.	Salacgrīva rural territory	Kubikmetrs, Ltd.	1.3	+			
15.	Umurga parish	Umurga utility company boiler house	1.3	+			
16.	Limbaži city	Latvia Timber International	1.25	+			
17.	Ainaži city	Kr.Valdemāra Ainaži primary school	1.14	+			
18.	Limbaži city	Tīne, Ltd.	1.02	+	+		
19.	Pāle parish	Pāle municipality primary school boiler house	1.0	+			
20.	Lēdurga parish	Lēdurga utility company	0.989	+			

Nr.	Location	Name, owner	Installed capacity, MW	Fuel used			
				Wood	Coal	Light fuel oil	Heavy fuel oil
21.	Braslava parish	Rest-house "Urgas"	0.86	+			
22.	Limbaži parish	Latvenergo electricity substation	0.83	+			
23.	Limbaži city	Sleikas, Ltd.	0.8	+			
24.	Vidriži parish	Vidrižu atvari, Ltd.	0.71	+			
25.	Limbaži city	Mozaīka, Ltd.	0.7	+			
26.	Salacgrīva city	Salacgrīva municipality boiler house Sporta Street 8	0.7			+	
27.	Aloja city	Latvenergo Aloja ETR	0.62	+			
28.	Salacgrīva city	Salacgrīva utility company boiler house Smilšu Street 3	0.61	+			
29.	Katvari parish	Barvi, Ltd.	0.5	+			
30.	Katvari parish	Katvari boarding-school	0.5	+	+		
31.	Vidriži parish	Vidriži municipality boiler house	0.5	+			
32.	Viļķene parish	Kokapstrāde Lielezers, Ltd.	0.5	+			
33.	Lēdurga parish	Druvas	0.48			+	
34.	Limbaži city	Limbaži district heating company boiler house Klostera Street 5	0.46	+			
35.	Vidriži parish	Brāļi, Ltd.	0.46	+			
36.	Limbaži city	Vidzemes Ceļi Limbaži department	0.45	+			
37.	Salacgrīva city	Vidzemes Ceļi Salacgrīva department	0.43	+			
38.	Staicele city	Staicele municipality boiler house	0.34	+			
39.	Limbaži city	Ratiko, Ltd. bakery	0.336	+	+		
40.	Limbaži city	Limbaži gardening	0.315	+			
41.	Limbaži city	Limbaži public utility company	0.315	+			
42.	Skulte parish	Dunte pluss, Ltd.	0.3	+			
43.	Limbaži parish	Limko, Ltd.	0.2	+			
44.	Staicele rural territory	Psychiatry Center	0.198	+	+		
45.	Limbaži parish	Lielezers, Ltd.	0.152			+	
Total installed capacity			**91.815**				

Data source: State agency of "Latvian Environment, Geology, and Meteorology Agency" data base "2-Gaiss"

There are a lot of comparatively small capacity wood fueled heat sources. Individual heating systems basically uses also wood fuel – wood logs, pellets, sawdust briquettes. Used equipment in most cases is obsolete and fuel is burned with low efficiency.

Almost all electricity is imported from surrounding regions. Except two small hydro power stations and wind generators in Ainaži (see Table 2) there are no other electricity generation sources in Limbaži region.

Table 2.2. Electricity generation sources in Limbaži region

Nr.	Location	Name	Installed capacity, MW	Energy type
1.	Skulte parish	Aģe hydro power station	0.05	Hydro energy
2.	Viļķene parish	Viļķene hydro power station	0.035	Hydro energy
3.	Ainaži rural territory	Ainaži Wind power station	1.2	Wind energy
Total installed capacity			**1.285**	

Table 2.2 shows that total electricity generation capacity is negligible. This means that Limbaži region is fully dependent from other regions and is not able to ensure electricity self-consumption.

According to Valmiera Regional Environmental Board annual report 2005, companies causing the highest air pollution in Limbaži region are Limbaži district heating company "Limbažu Siltums", Joint Stock company "Brīvais Vilnis", Dairy processing plant "Limbažu Piens" and Limbažu Ceļi, Ltd. Biggest fossil fuel (coal, heavy fuel oil and light fuel oil) users are Dairy processing plant "Limbažu Piens", Limbaži district heating company "Limbažu Siltums", Ratiko, Ltd., Limbažu Ceļi, Ltd., Aloja – Starkelsen and Lielezers, Ltd. Total amount divided by different type of fuel used in Limbaži region largest heat sources is showed in *Figure 2.3*.

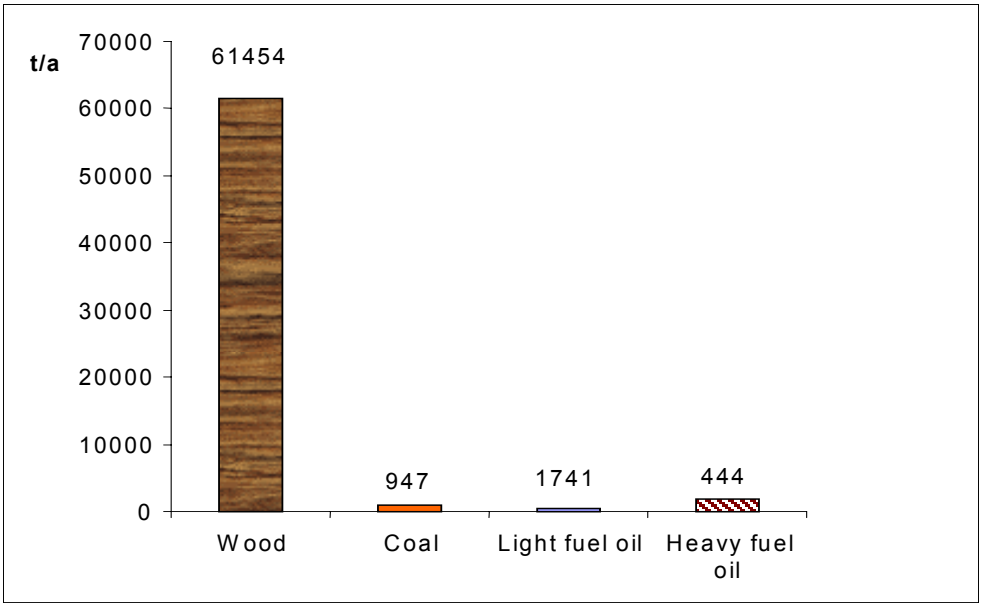


Figure 2.3: Use of fuel in Limbaži region heat sources, 2005

One of the main reasons for extended use of wood fuel in Limbaži region is the inaccessibility to the natural gas grid. According to Joint Stock Company "Latvijas Gāze" Annual Report 2005 there are future plans to build a pipeline branch from the cross-country pipeline to Limbaži region – through Limbaži city to Salacgrīva. Existing and future planned pipelines are specified in *Figure 2.4*.

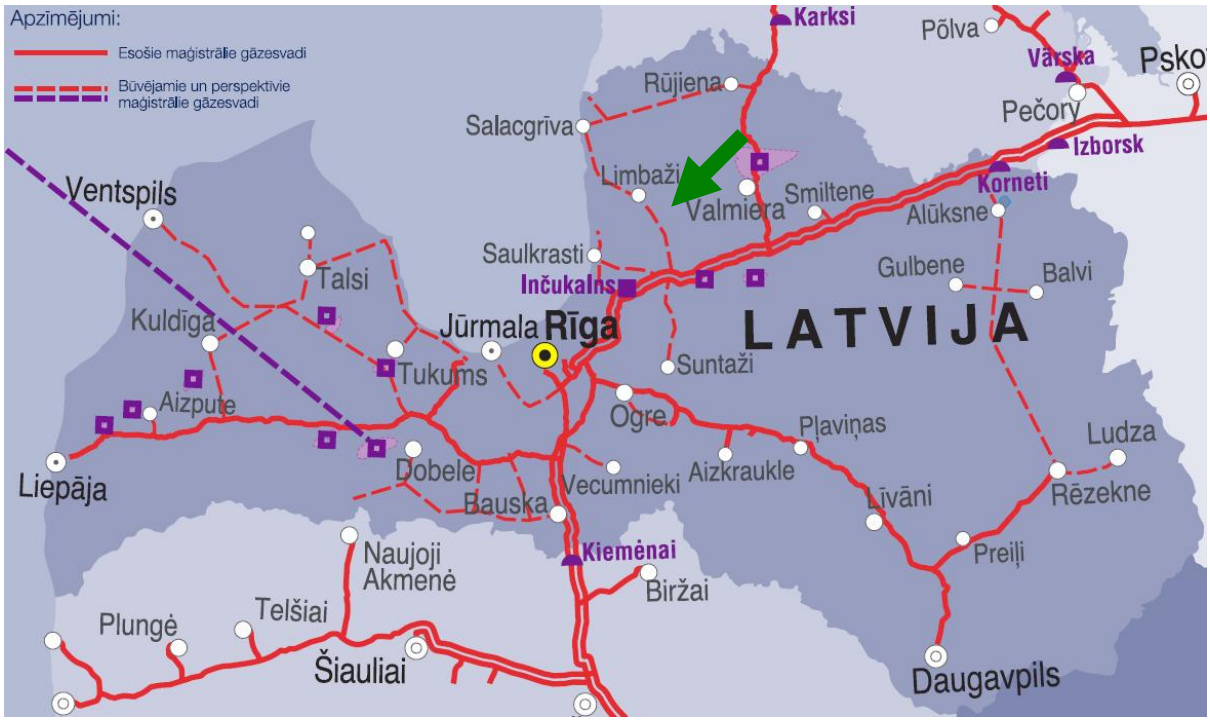


Figure 2.4: Existing and in future planned natural gas cross-country pipelines

Data source: JSC "Latvijas Gāze" Annual Report 2005

Electricity to Limbaži region is provided from State Joint Stock Company “Latvenergo”. Limbaži region is included in Northern Electrical Network area with center in Valmiera. 110 kV electric lines Saulkrasti – Limbaži –Aloja and Aloja – Salacgrīva are crossing the region and supplying with electricity local substations in Limbaži, Aloja and Salacgrīva.

2.3 Analysis of RUE/RES potentials

2.3.1 Analysis of potentials for energy savings

2.3.1.1 Households

In general energy efficiency in households in Limbaži region is low. According to previously investigations on Latvian multi-apartment building the average annual specific heat consumption is about 230 – 250 kWh/m^2 including domestic hot water consumption. Since in lot of buildings in Limbaži region domestic hot water is not supplied, it is possible to assume that the annual specific heat consumption is in the range of 200 kWh/m^2.

From the interviews with local stakeholders, total number of multi-apartment buildings is about 270, but fully insulated are only 2 buildings, end walls insulated for 20 buildings and roof insulation separately were done for one building. Accordingly evaluated energy efficiency potential in housing sector is 50 000 – 100 000 MWh per year.

All buildings are private, except few, which are municipal owned. Private apartments are partly changing windows, occasionally also outdoors are changed. Only small part of buildings connected to district heating has individual heat substations installed.

Regarding to municipality support for building insulation, there are different positions and situations:

- Small municipalities are not ready to support energy efficiency measures in private buildings, because of their limited budget. Energy efficiency measures at first will be implemented in municipality owned buildings.
- Larger municipalities – Limbaži city, Salacgrīva and Ainaži are ready to support energy efficiency measures in multi-apartment buildings. For example, Limbaži city council is ready to promote energy efficiency measures, and in case of need also financial support, but only with the condition that the initiative will come from maintenance service companies.
- Salacgrīva municipality is ready to give loan or even subsidy, by allocating the funding from the privatization fund.
- Ainaži municipality has allocated extraordinary allowance of 2000 Lats for energy efficiency measures in multi-apartment buildings.

2.3.1.2 Public sector and commercial services

Regarding the data obtained during interviews with local stakeholders, there are about 120 public buildings. Most part of them is municipality owned and therefore more energy efficiency measures are implemented. Fully insulated are 9 buildings, roof insulation is done in 4 buildings, windows are changed in 12 buildings and individual heat substation is installed in one building.

Insulation and change of windows is done within limits of municipalities and also in future is planned to continue this work. Several projects were submitted for ERDF funding and were rejected. Without ERDF funding municipalities has taken loans, or received support from the Latvian Government for the implementation of energy efficiency project.

2.3.1.3 Industry and agriculture

The main industrial enterprises in Limbaži region and their field of operation are given in Table 2.3.

Table 2.3. Significant industrial enterprises in Limbaži region

Company name	Location	Field of operation
JSC "Brīvais Vilnis"	Salacgrīva city	Fish processing and tinning
Ratiko, Ltd.	Limbaži city	Confectionery production
JSC "Limbažu Piens"	Limbaži city	Dairy processing plant
Lielezers, Ltd.	Limbaži city	Bakery
Aloja Starkelsen, Ltd.	Ungurpils village, Aloja rural territory	Potatoes starch production
Latvia Timber International, Ltd.	Limbaži city	Timber production
Kokapstrāde – Lielezers, Ltd.	Viļķene parish	Timber production
Mozaīka, Ltd.	Limbaži city	Timber production
Vidrižu atvari, Ltd.	Vidriži parish	Parquet production
Limbažu Ceļi, Ltd.	Limbaži city	Bituminous concrete production

The highest energy efficiency potential in industry is estimated for energy savings in heat energy production (incl. steam) by reducing heat losses in heat generation, transmission and usage in technological processes. As well high potential is estimated for electricity savings, e.g., replacement of old inefficient electrical motors, installation of efficient cooling, ventilation and lighting systems.

2.3.1.4 District heat production

District heating (DH) systems exist in the following places:

- Limbaži city
- Aloja city
- Salacgrīva city
- Umurga village
- Pociems village (in Katvari parish)
- Liepupe village
- Ozolmuiža village (in Brīvzemnieki parish).

Comparative overview of DH systems is given in Table 2.4.

Table 2.4. Comparative overview of DH systems in Limbaži region

Location	Heat source	Installed capacity, MW	Heat source efficiency	Fuel used	Annual fuel consumption, t*
Limbaži city	Cēsu Street 31	12,5	0,70	Wood chips/ sawdust, Light fuel oil Heavy fuel oil	16352.97 3.70 172.81
	Jaunatnes Str. 6	6,58	0,84	Wood chips Light fuel oil	19983.10 1.33
	Klostera Str.5 (in reserve)	0,46	-	-	-
Aloja city	Skolas Street 6a	1,5	0,80	Wood residues/ sawdust/ wood chips	803.80
Salacgrīva	JSC “Brīvais vilnis”	30,69	0,80	Wood chips Heavy fuel oil	8088.30 521.69
	Tirgus Str. 7	1,1	0,70	Wood chips, wood logs	1500.00
	Smilšu Str. 3	0,7	0,67	Wood logs	329.00
	Smilšu Str. 13	0,9	0,67	Wood logs	880.00
	Sporta Street 8	1,4	0,92	Light fuel oil	176.90
Umurga	Mehanizācijas Str. 1	1,3	0,80	Sawdust	1465.80
Pociems	Katvari municipality	1,0	0,85	Wood logs	730.00
Liepupe	Liepupe municipality	1,5	0,80	Wood logs Coal	1064.22 21.26
Ozolmuiža	Ozoli vocational secondary school	3,5	0,50	Wood logs	1546.40

* - Fuel consumption in 2005

As shown in Table 2.4, the efficiency of the DH systems is rather low. Approximately 50% of the DH systems are mainly using wood logs, which are burned with very low energy efficiency. Partly fossil fuels – light fuel oil, heavy fuel oil and coal are used. In this case there is potential for fuel switching projects.

2.3.1.5 Distribution networks

DH networks are fully renovated in Pociems, where in year 2004 pre-insulated pipes were installed. Networks are partly renovated in Limbaži, Aloja and Salacgrīva. Large part of the networks were built in the 70-ties and the old sections are in very bad technical condition, e.g., in Umurga some pipelines inside underground channels are in flooded. One more significant problem is that often small DH system networks are too long (they were constructed when existed big heat loads).

Detailed information on DH networks in different systems is given in Table 2.5.

Table 2.5. Information on DH networks

	Length, km	Losses, %	Age, Years	Length of reconstructed sections, km
Limbaži	17,2	30	25-30	2,5
Aloja	1,8	17	30	1,5
Salacgrīva	0,7	23	30	0,2
Umurga	0,5	35	30	0
Pociems	1,0	3	3	1,0
Ozolmuiža	0,9	30	35	0

Table 2.5 is showing that DH systems have big potential to reduce heat losses through networks.

2.3.2 Analysis of potentials of RES

2.3.2.1 Solar thermal and PV energy

In Table 2.6 are given data on solar radiation in Riga. Since distance between Riga and Limbaži region is comparatively small, it is assumed that solar radiation will be at similar levels.

Table 2.6. Solar radiation in Riga

	Global radiation, kWh/m^2	Diffuse radiation (horizontal), kWh/m^2
January	13	10
February	32	17
March	74	40
April	107	55
May	155	82
June	170	89
July	161	87
August	124	76
September	75	48
October	37	25
November	13	10
December	8	6
Year	***966***	***545***

Sunshine duration is indicative determinable from the map given in *Figure 2.5*. In Limbaži region there are about 1700 – 1900 sunshine hours annually.

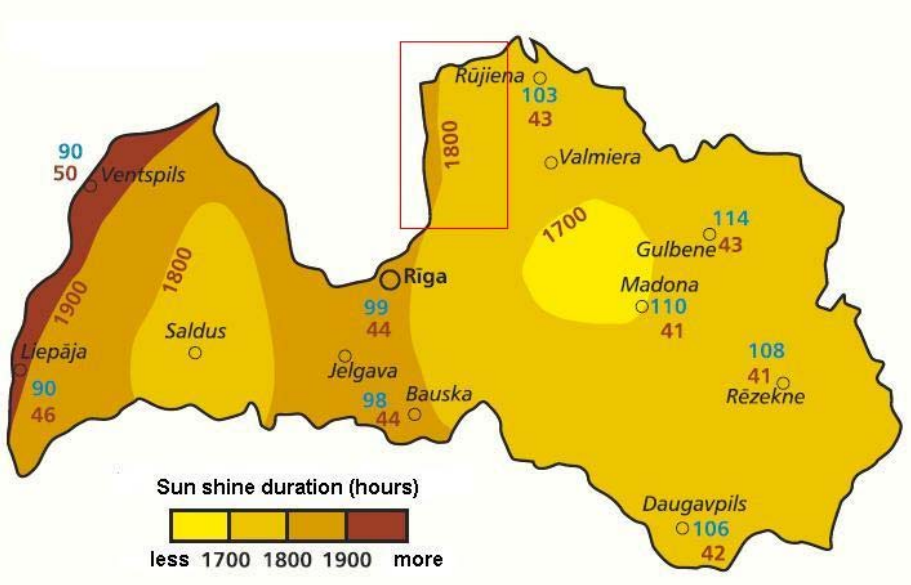


Figure 2.5: Sunshine duration map for Latvia

2.3.2.2 Hydro energy

Two small hydro power stations are operating in Limbaži region. Their total capacity is 0,085 MW. There has been interest on development of new hydro power station (in Ungurpils), however its capacity would be only a few hundred of kW and hydro energy potential is evaluated as negligible.

2.3.2.3 Wind energy

Overview on common wind directions and speed in Limbaži region is given in Table 2.7 and Table 2.8.

Table 2.7. Typical wind directions in Limbaži region

	Wind direction, %								Calm conditions
	N	NE	E	SE	S	SW	W	NW	
January	8	9	14	19	23	13	9	5	1
February	7	7	16	18	23	13	8	8	2
March	8	7	16	14	25	14	8	8	2
April	10	9	14	11	18	14	12	12	2
May	11	12	15	9	13	13	13	14	2
June	11	9	11	7	12	15	18	17	2
July	10	6	11	9	13	18	18	15	2
August	8	8	11	11	15	18	17	12	3
September	8	7	11	14	17	18	14	11	2
October	8	4	11	16	21	18	12	10	1
November	8	6	12	19	23	14	10	8	1
December	8	7	13	20	21	14	10	7	1
Annual average	9	7	13	14	19	15	12	11	2

Table 2.8. Average wind speed in Limbaži region, m/s [7]

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual average
5,1	4,7	4,7	4,3	4,0	3,8	3,8	4,0	4,5	5,1	5,4	5,2	4,5

Visual information on average wind speed in different height is shown in wind maps in *Figure 2.6*.

Wind maps are showing that wind speed in Limbaži region is higher than Latvian average. Today Limbaži region already have experience in using wind energy. Two Joint Stock Company “Latvenergo” wind generators are installed in Ainaži with total installed capacity 1,2 MW.

Local entrepreneurs are very interested in development of new wind parks. For example Salacgrīva municipality allowed to develop new wind generators, but for political reasons from the national government this project was stopped. In Liepupe parish Baltic Wind, Ltd. is planning to install 5 wind generators. This project is going through coordination process and has faced the problems with environmental issues due to the proposed location - the territory of planned wind park is partly included in North-Vidzeme biosphere reserve.

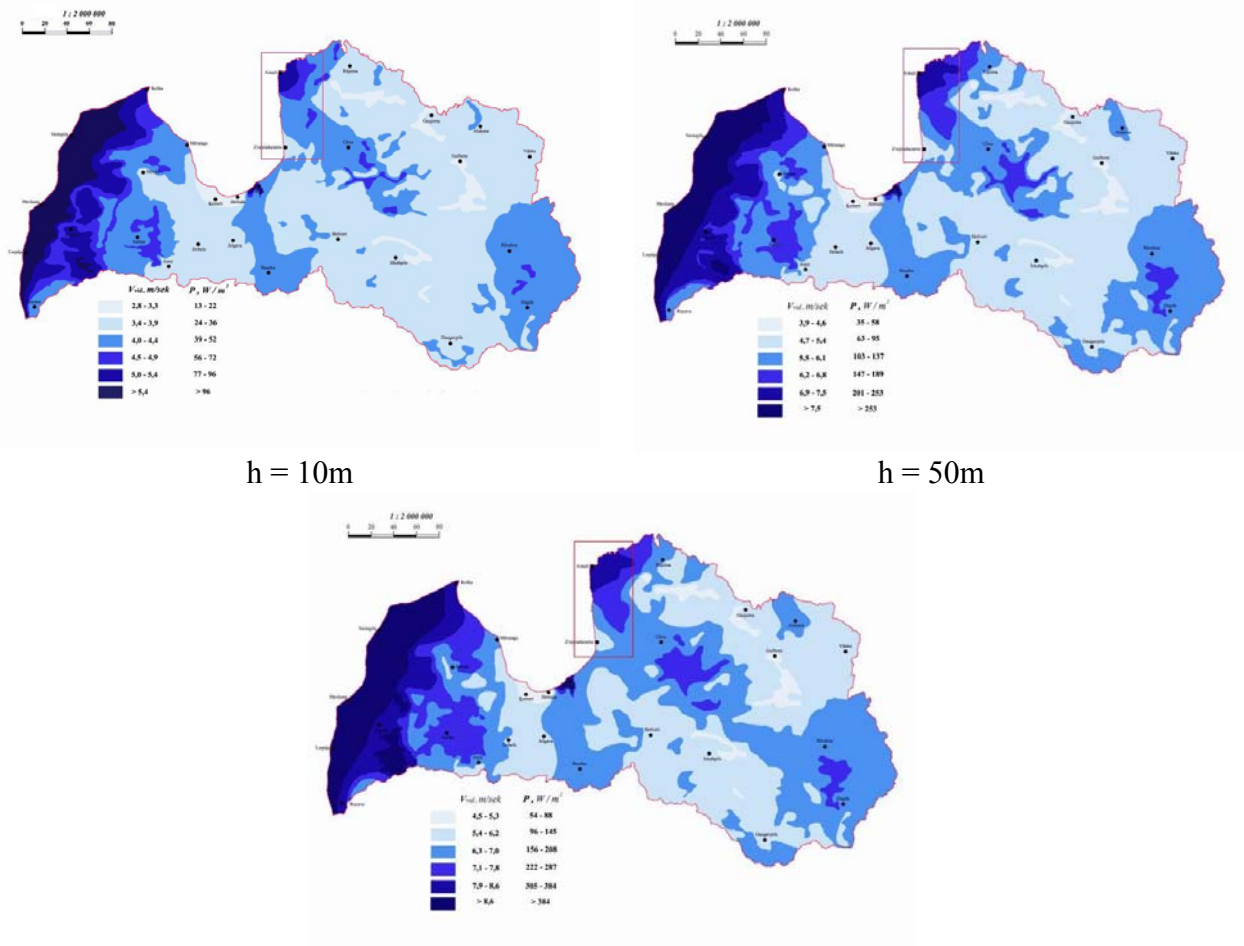


Figure 2.6: Annual average wind speed in Latvia in different height

2.3.2.4 Geothermal energy or ambient heat

The potential of geothermal energy and ambient heat in Limbaži region is evaluated as low. There are heat pumps installed in some individual buildings, but their time of operation is too short to consider the benefits of this technology.

In Latvia some investigations are made to evaluate the performance of heat pump technology. One of them (*Data source: R.Jankovskis – Heat Pump Performance Analysis in Latvia, Riga Technical University, 2006*) is prepared using existing technology in individual house in Riga region. The results have showed that heat pump technology operational costs are high compared with other heating technologies. Operational costs are 2 times higher then using wood fuel or natural gas. Investigation showed that it is economically profitable to use fossil fuels instead of using electricity for heat pump operation.

2.3.2.5 Biomass

In 2005 total forestland in Limbaži region was about 90 700 ha, including 30 200 ha of coniferous forests and 54 800 ha of deciduous forests. Structural division of forestlands is given in *Figure 2.7*.

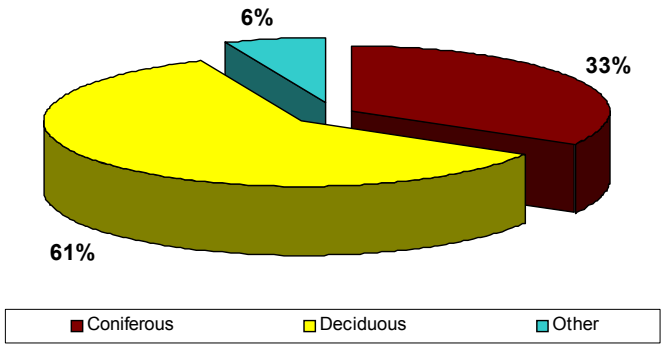


Figure 2.7: Forest structure in Limbaži region, %

Biggest area is occupied by deciduous forests (61%) and almost 2 times less – 33% coniferous forests. Total forest cover in Limbaži region in 2005 was 37,6%. Only part of energy obtained from cut of forests is used in Limbaži region.

Waste wood from forestry, processing industry, gardens and parks

There are a lot of timber processing companies in Limbaži region. Overview on timber companies is given in Table 2.9.

Although there are more then 40 companies producing wood residues, large part of them is very small and is using residues for self-consumption or selling only small amounts. Bigger companies, e.g., Latvia Timber International, Ltd. all residues are basically exporting, however partly wood residues come into local market like wood logs, sawdust and wood chips.

Table 2.9. Timber processing companies in Limbaži region

Location	Nr.	Company name	Field of activities
Limbaži city	1.	Latvia Timber International, Ltd.	Timber production
	2.	Mozaīka, Ltd.	Timber production
Salacgrīva city	3.	Joint Stock Company "Grīva"	Furniture production
	4.	Īveja, Ltd.	Timber processing
	5.	NSB, Ltd.	Timber processing
Ainaži city	6.	Dandijs un BO, Ltd.	Timber processing, forestry
	7.	Farm "Zvīguļi"	Timber processing
	8.	Farm "Mednieki"	Timber processing
	9.	Mičs un parneri, Ltd.	Timber processing, forestry
Aloja city	10.	Balts, Ltd.	Building material production
	11.	Miks D, Ltd.	Timber processing
	12.	Impulss, Ltd.	Timber processing
	13.	Alojas komunālais dienests, Ltd.	Packaging material production
Vidriži parish	14.	Vidrižu atvari, Ltd.	Parquet production
	15.	Frip, Ltd.	Timber production
	16.	Brāļi, Ltd.	Timber production, drying
Viļķene parish	17.	Kokapstrāde – Lielezers, Ltd.	Building material production
	18.	Farm "Celiņi"	Timber processing
	19.	Farm "Rūstuži"	Joinery
Pales parish	20.	Oranda, Ltd.	Packaging material production
	21.	Rameks M, Ltd.	Timber processing, forestry
	22.	Farm "Lieljuri"	Joinery
Limbaži parish	23.	Limko, Ltd.	Building material production
	24.	Nabe, Ltd.	Furniture production
	25.	Ekla, Ltd.	Timber production
	26.	Koks un CO, Ltd.	Timber production
Katvari parish	27.	Sole trader „K.Puisīša kokzāģētava"	Timber production
	28.	Farm „Paupi"	Timber production
	29.	Aula AS, Ltd.	Building material production
	30.	Bravi, Ltd.	Wood chips production
	31.	Pekabo, Ltd.	Packaging material production
	32.	Farm „Kalndambji"	Timber processing, forestry
	33.	Farm „Ābelītes"	Packaging material production
Lēdurga parish	34.	Farm „Buļkalni"	Sawmill
	35.	Legzdiņš, Ltd.	Sawmill
	36.	Dravenieki D.Z., Ltd.	Sawmill
	37.	Lauma Koks, Ltd.	Furniture production
Umurga parish	38.	Zibens un CO, Ltd.	Forestry
Braslava parish	39.	Būvkoks, Ltd.	Forestry, timber processing, drying
Liepupe parish	40.	Sole trader „Universs"	Joinery
	41.	Kukurs un Partneri, Ltd.	Timber processing
	42.	Kāpnes LV, Ltd.	Joinery
	43.	Mustkalni, Ltd.	Timber processing
Skulte parish	44.	Vidko, Ltd.	Timber processing, furniture production

There are several fuel producers in Limbaži region. Mainly wood chips are prepared for local consumption as well for exports. For example wood chips producers are Farm “Tēraudi”, Marko K, Ltd., Aloja public utility company, Salacgrīva public utility company, Bravi, Ltd., Farm “Jaunkarnas”, GP Kalējkalni, Ltd. and other. Aloja and Salacgrīva public utility companies are managing municipal forests and cleaning roadsides and ditches from bushes and crushing them into wood chips.

In Ainaži is located one of the best-known pellet producers in Latvia – Lubiņš un CO, Ltd. pellets and pellet boiler manufacturer “Grandeg”. Since in Limbaži region more than in other Latvia regions pellet boilers are used, it is expected to increase pellet production amounts in future. For example, in village Tūja (Liepupe parish) Tūjas Zeme, Ltd is planning to build a new pellet production plant. Company has tested pellet production from peat, but in future it is planned to use wood or grain for pellet production.

In Pāle parish there is JSC “Seda” producing peat briquettes in swamp “Lielais Ērgļu purvs”.

Agricultural wastes (straw, waste from crops processing, etc.)

Agricultural land in Limbaži region occupies about 900 km^2 or 35% from all region territory. In 2004 sown area of cereal crops was 15 384 ha.

During next few years company Barība 2002, Ltd. has planned to build new agro-pulp and bio-energy plant where straws and recycling paper will be used as raw materials for office paper and fertilizer (as by-product) production. In the frame of project new CHP plant is planned to install and use sawdust and wood chips as fuel (78 000 t per year). For heat consumption gardening complex and possibly also residential complex is planned to build. Now this project is going through environmental impact assessment procedure and if this process will be successful, it is planned to start reconstruction in summer 2007 and finish after 2 years.

If this project will be implemented, straw from Limbaži region will be completely used for plant production.

Potential for energy crops (on unused agricultural land or as replacement of excess food production)

Like throughout Latvia also in Limbaži region are large unused and overgrown territories. The potential for energy crops is high. There is not any entrepreneurs in growing energy crops in Limbaži region, only some companies have obtained chip crusher technologies for cutting and chipping existing overgrown areas not only in Limbaži region but also in surrounding regions.

2.3.2.6 Biogas

Biogas from landfills

With support for European Commission in 2004 in Vidzeme region (where Limbaži region is included) were created landfill for solid waste processing and dumping. Landfill was located in Cēsis region in Stalbe parish – village Dalbe. From this moment all municipal waste from Limbaži region is transported to new landfill and existing waste disposal areas closed and recovered. For this reason production of biogas in Limbaži region waste disposal areas is unlikely.

Biogas from wastewater treatment

In several small municipalities wastewater treatment plants are in very bad condition. However, with support from EU Cohesion Funding and Latvian government the overall situation has improved by implementation of water management development projects – reconstruction of existing water supply and water treatment facilities.

Biogas potential from wastewater treatment plants in Limbaži region is not high due to the small wastewater amount.

Biogas from organic materials (animal manure and litter, biodegradable wastes, green biomass from maintenance of parks, etc.)

In Limbaži region agricultural production is well developed, mainly – dairy production and beef cattle farms. Companies do not have any problems with utilization of manure – they are partly sold and the rest is used for agricultural land fertilization. For the present there is not any biogas production plant in Limbaži region.

Company B.G.D., Ltd. wanted to build biogas cogeneration plant in Brīvzemnieki parish Ozolmuiža village. They planned to use green biomass for biogas extraction and have concluded agreements with local farmers. Unfortunately this project has stopped due the lack of funding. Brīvzemnieki municipality was very interested in project implementation because this could solve the problems with DH system in Ozolmuiža.

2.3.3 Identification of available RES/RUE options in the region

Based on the investigation on Latvia priorities for Structural Funds and Cohesion Fund in 2007-2013, in the frame of Energy 4 Cohesion project following projects were identified:

1) Solar energy projects

Heating in municipal public buildings (schools, libraries, administrative buildings, recreation centers, museums, hospitals, etc.) is provided from local heat sources as well from DH systems.

To install solar collectors for heat production to cover heat and hot water demand it is necessary to select the objects corresponding the following requirements:

- Building orientation;
- Shading;
- Heat load duration curve;
- Hot water system requirements;
- Other specific requirements.

Funding for solar energy projects will be provided from Cohesion Fund in the frame of Operational Program “Infrastructure and Services”, priority 5, activity 5.2.1 “Measures Regarding the Increase of Efficiency of DH systems”.

2) Wood log boiler replacement

There are a lot of obsolete boilers where wood logs are burned inefficiently. These boilers are cheap and this is the main reason for purchasing and installing them.

To change inefficient boilers for heat and hot water supply it is necessary to perform an energy audits. The following requirements should be taken into account:

- Energy efficiency of existing boilers;
- Reconstruction of existing boilers;
- Wood log (with definite quality) availability for new boiler;
- Other specific requirements.

Funding for wood log boiler replacement projects will be provided from Cohesion Fund in the frame of Operational Program "Infrastructure and Services", priority 5, activity 5.2.1 "Measures Regarding the Increase of Efficiency of DH systems".

3) Increasing proportion of pellet boilers

The use of pellet boiler in Limbaži region is higher than in other Latvian regions. The main reason is the location of a pellet boiler industry in Ainaži, which is the only pellet boiler production plant in Latvia. Pellet boilers are not cheap, but their efficiency is 2 times higher than the existing wood log boilers.

To install pellet boilers for heat and hot water supply it is necessary to perform energy audits and make objective selection complying with the following requirements:

- Energy demand and load;
- Reconstruction of existing boilers;
- Pellets availability for the boiler;
- Other specific requirements.

Funding for pellet boiler installation projects will be provided from Cohesion Fund in the frame of Operational Program "Infrastructure and Services", priority 5, activity 5.2.1 "Measures Regarding the Increase of Efficiency of DH systems".

4) Increasing proportion of wood chip boilers

The use of wood chip in Limbaži region is smaller than in other Latvian regions. The main reasons are the following – the use of wood chips in small capacity boilers are not very popular in Latvia and it is not favorable to deliver small amount of wood chips and the experience in using wood chips for bigger boilers in Limbaži region cities has not been successful.

Typically wood chip boilers have efficiency of 1,5 – 2 times higher than existing wood log boilers.

To install wood chip boilers for heat and hot water supply it is necessary to perform energy audits and make object selection complying with the following requirements:

- Energy demand and load;
- Reconstruction of existing boilers;
- Wood chips availability for the boiler;
- Other specific requirements.

Funding for wood chip boiler installation projects will be provided from Cohesion Fund in the frame of Operational Program “Infrastructure and Services”, priority 5, activity 5.2.1 “Measures Regarding the Increase of Efficiency of DH systems”.

5) Wind energy projects

Limbaži region already have experience in using wind energy. Two wind generators of Joint Stock Company “Latvenergo” are installed in Ainaži, as well local entrepreneurs are very interested in development of new wind parks. To evaluate wind energy project development possibility, it is necessary to consider the following requirements:

- Wind potential on site;
- Land ownership issues;
- Environment protection requirements;
- Other specific requirements.

Funding for wind energy projects will be provided from Cohesion Fund in the frame of Operational Program “Infrastructure and Services”, priority 5, activity 5.2.3 “Development of wind electricity generation plants”.

6) Biomass Cogeneration plants

There are not CHPs in Limbaži region, but some projects are planned with building new production plants with installation of biomass cogeneration unit.

Special funding for renewable energy cogeneration projects will be provided from Cohesion Fund in the frame of Operational Program “Infrastructure and Services”, priority 5, activity 5.2.2 “Development of Cogeneration Power Plants Utilizing Renewable Energy Sources”.

7) Energy efficiency projects in buildings

Energy efficiency projects will be supported only in multi-apartment buildings. In the frame of Operational Program “Infrastructure and Services”, priority 4, activity 4.4.1 “Measures of Improvement of Heat Insulation of Multi-apartment Residential Buildings” is defined that from ERDF support will be given only to cover 20% of total costs. This division was made to support as much as possible projects in solving insulation problems in cities of Latvia.

8) Energy efficiency projects in DH networks

DH system networks is being step-by-step reconstructed, however, in many places pipes are in very bad condition and it was one of the reasons for closing DH system.

Funding for energy efficiency projects in DH networks will be provided from Cohesion Fund in the frame of Operational Program “Infrastructure and Services”, priority 5, activity 5.2.1 “Measures Regarding the Increase of Efficiency of DH systems”.

9) Innovative technology projects

Innovative technology projects include biomass fuel production projects, agro-pulp projects, “eco-building” projects, e.g., environmentally friendly housing, using of clean materials, low energy buildings (passive houses).

There is not special support for this kind of projects in operational programs, however, some activities could be integrated in other projects and receive funding in the frame of Operational Program “Infrastructure and Services”.

2.3.4 SWOT analysis

Energy supply side of the Limbaži Region - technical and economic availability of energy sources	
Strengths	**Opportunities**
▪ Well developed district heating systems (incl. heating plants based on biomass) ▪ High share of biomass used in heating ▪ Reliability of supply is high ▪ Renewables are used mainly in the form of biomass (wood and wood waste) in family houses, and some block boilers ▪ High potential for renewables in the future ▪ Potential for renewable technologies production, installation ▪ Good wind potential for electricity generation	▪ Reconstruction and modernisation of heat production capacities ▪ Increased support to electricity production from renewables from EU structural funding. ▪ Support to decentralised supply ▪ Strengthening distribution systems and reduction of distribution losses ▪ Use of biomass in bigger plants using modern gasification technologies ▪ Implementation of energy audit recommendations ▪ Support to competitiveness, stabilisation and modernisation of DH systems
Weaknesses	**Threats**
▪ No connection to gas network ▪ Big share of wood logs in heating systems ▪ Low potential of geothermal and hydro energy	▪ Increase of energy prices in the world market ▪ Low support to renewables and efficiency of production and transformation processes ▪ Lack of capital for distribution networks investment (DH schemes) ▪ Lack of capacities for projects development in RUE and RES ▪ Lack of positive experiences in using solar energy for heating in Latvia

Energy demand side of the Limbaži Region – structure and efficiency	
Strengths	**Opportunities**
▪ There are some positive examples with energy efficiency measures implemented in public as well in residential buildings ▪ Broad offer of energy efficient technologies and appliances in the market ▪ Availability of technologies and capacities for buildings reconstruction, insulation, etc. for efficiency increase ▪ Potential for energy savings large also in industry and tertiary sector ▪ Availability of State funding for energy efficiency measures in municipal buildings and DH systems	▪ Implementation of energy audits ▪ Potential for increased independence and self sufficiency in energy supply in the region through increased efficiency, supported by new legal requirements of the EU ▪ Awareness campaigns for inhabitants promoting energy efficiency increase and renewable energy efficient use ▪ Promotion of alternative fuels in transport
Weaknesses	**Threats**
▪ Lack of energy audits in public and residential buildings ▪ Climate in autumn and winter season is cold, resulting in higher demand for heat ▪ Consumption of energy concentrated into several major DH utilities and industrial plants ▪ Low ability to cope with gas and electricity prices increase in low wages families (share of energy cost is high) ▪ Losses in the final demand for energy are high ▪ Promotion of RUE and RES between inhabitants is low ▪ Current status in RES use involves mainly wood use in household boilers ▪ Low awareness on economic benefits of increase energy efficiency	▪ Lack of finance for projects developing energy efficiency and renewables infrastructure ▪ Lack of capacities for development of projects ▪ Lack of attention and funds for awareness increase ▪ Increase of energy prices ▪ Low ability to develop RUE and RES projects ▪ Lack of funds for promotion of RUE and RES, mainly in households

3. Energy Vision

3.1 Energy Vision milestones

In Table 3.1 is summarized the overview of an outlook of renewable energy and energy efficiency projects in municipalities of Limbaži region based on the analysis of RUE/RES potentials described in Chapter 2.3.

Table 3.1. Different project suitability for each municipality

	Solar energy	Wood log boiler replacement	Wood pellets	Wood chips	Wind energy	CHP	Energy efficiency in public buildings	Energy efficiency in DH networks	Innovative technologies
Limbaži city	+		+	+		+	+	+	+
Salacgrīva city	+	+	+	+	+	+	+	+	+
Ainaži city	+	+	+	+	+	+	+	+	+
Aloja city	+	+	+	+		+	+	+	+
Vidriži parish	+	+	+	+			+		+
Skulte parish	+	+	+	+			+		+
Braslava parish	+	+	+	+			+		+
Umurga parish	+		+	+		+	+	+	+
Limbaži parish	+	+	+	+		+	+		+
Katvari parish	+		+	+			+		+
Lēdurga parish	+	+	+	+			+		+
Liepupe parish	+	+	+	+	+		+	+	+
Viļķene parish	+	+	+	+			+		+
Pāle parish	+	+	+	+			+		+
Brīvzemnieki parish	+	+	+	+		+	+	+	+

3.2 Objectives and priorities

According to the evaluation of region's existing energy situation future development scenarios were created for the time period until year 2030 (*data source: I. Dzene – Investigation of Existing Energy Situation in Limbaži region, Riga Technical University, 2007*). Two scenarios were developed – a reference and energy efficiency scenario. Regarding these scenarios region's future energy demand was forecasted. Energy demand in Limbaži region by different scenarios is shown in *Figure 3.1*.

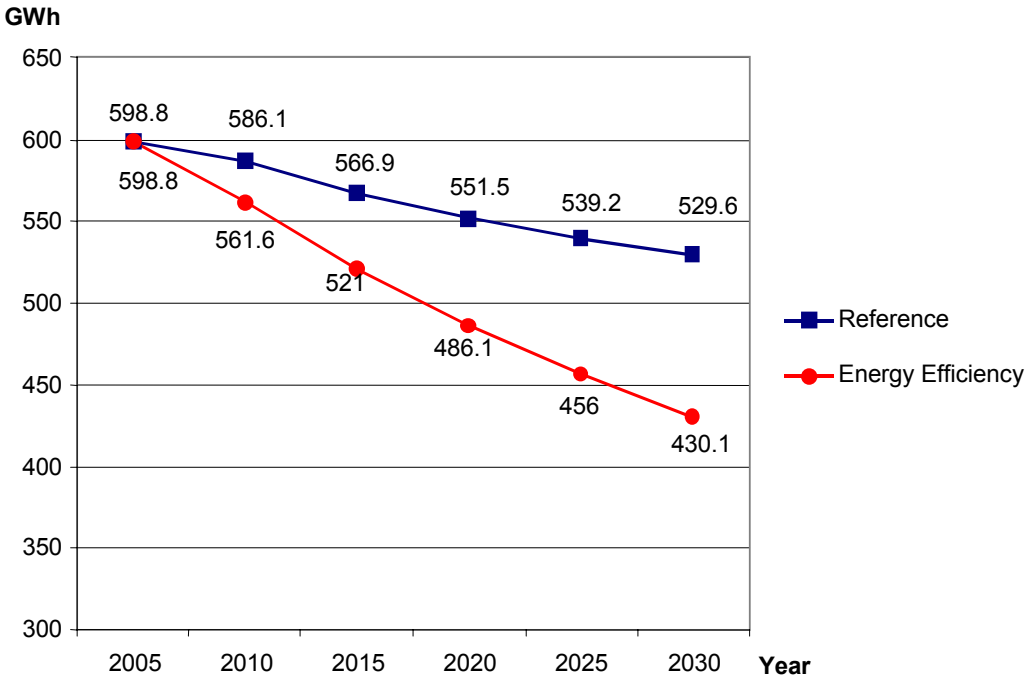


Figure 3.1: Forecasted Limbaži region future energy demand in two scenarios

The results are showing that energy consumption is decreasing every year and after comparing the both scenarios it was predicted that implementation of energy efficiency measures can save up to 19% of total energy consumed.

The future energy supply and improved energy management are in line with sustainable development principles and enable dynamic development of the Limbaži region and are based on three key objectives:

- Reliable, available and diversified energy supply, maximal use of locally available resources;
- Effective, well planned and managed energy production and consumption;
- Reduction of current pollutants and CO_2 emissions from fuel combustion and improvement of ambient air quality.

Structure of the Energy vision of Limbaži region is given in *Figure 3.2*.

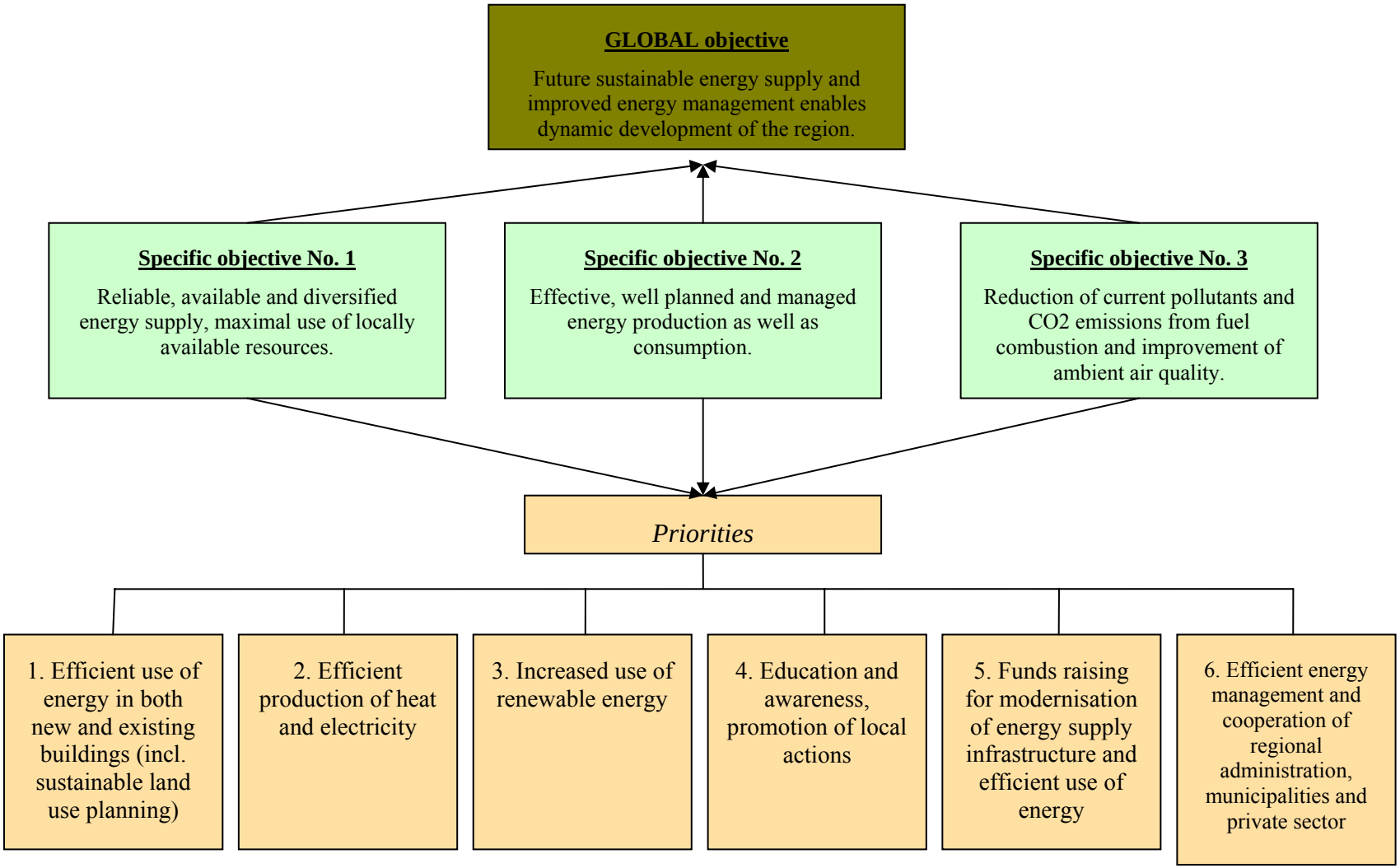


Figure 3.2: Structure of the Energy vision of Limbaži region

3.3 Presentation of feasible Energy Actions/Action Bundles suitable for Structural Funds

Energy vision can be implemented only with the development of concrete projects. Most feasible energy actions were identified during interviews with local stakeholders as well after evaluation of obtained data. The energy actions identified are the following:

1) Installation of solar collectors on municipal public buildings;
2) Insulation of multi-apartment buildings with support of municipality and EU Funding;
3) Biomass market development;
4) Increasing wood fuel combustion efficiency in heating systems;
5) Biomass cogeneration plant building projects;
6) Support for “eco-building” (environmentally friendly, clean material, low energy) projects;

Additional investigations have to be made to identify barriers, to estimate benefits and potential drawbacks for each action.

The next step of Limbaži region Energy Master Plan is to develop further the energy actions presented and to merge them in four project bundles. After that additional investigation for each project bundle will be provided. For this information please see the next Chapter 4.

After the discussions with local stakeholders it was decided to develop four project bundles. The basic information on each project bundle is given below.

Action Bundle 1 – Fuel switching with installaton of solar collectors
Proposal includes implementation of fuel switch project in existing Salacgrīva municipality boiler house and installation of solar collector on the roof of kindergarten for hot water preparation.
Current state
There is an existing boiler house in the center of Salacgrīva city. Boiler house total capacity is 1,4 MW and light fuel oil for heat generation is used. Consumption of light fuel oil is 180 t/year. Salacgrīva Municipality wants to switch fuel to local wood fuel (wood pellets). Connected heat consumers are school building, kindergarten and sport complex. Additionally it is planned to install solar collector on the roof of kindergarten building.
Technological solution
The proposed technological solution for boiler house is to replace existing light fuel oil boilers with new wood pellet boilers. Additional building for fuel storage room and new boilers is necessary. On the roof of kindergarten (one of the consumers building) solar collectors with accumulation tank is planned.
Investors
The main investor is Salacgrīva municipality.
Benefiting groups
The benefiting groups are: • Salacgrīva municipality • Heat consumers • Local inhabitants
Financing
The financing could be provided by the Salacgrīva municipality from the planned investment budget. The half part of the investment (up to 50%) is envisaged to be received as support from Operational Programme Infrastructure and Services 2007-2013.
Expected investment costs
Approx. 198 thous.LVL (282 thous. EUR)
Expected implementation time
Year 2008-2010

Action 2 – Biomass CHP Plant in Limbaži city
Proposal includes development of biomass fired CHP Plant in Limbaži city.
Current state
Currently there are two boiler houses operating in Limbaži city. Biomass (wood chips and sawdust) is the main fuel used, then to cover peak loads as well as fossil fuels (light fuel oil and heavy fuel oil) are used. Project activities include installation of cogeneration unit for one of the existing boiler houses and providing hot water from one boiler house (potential cogeneration plant) to both Limbaži district-heating systems during the summer season.
Technological solution
The proposed technological solution is installation of steam turbine with capacity 2.0 MW_{el} and 14 MW_{th}. Wood chips fuel will be used.
Investors
The main investors are Limbaži municipality and municipal DH Company "Limbažu Siltums".
Benefiting groups
The benefiting groups are: • Limbaži municipality • DH Company "Limbažu Siltums" • Heat consumers
Financing
The financing could be provided by the Limbaži municipality and DH company. Some part of the investment (up 50%) is envisaged to be received as support from Operational Programme Infrastructure and Services 2007-2013.
Expected investment costs
Approx. 4.9 mil.LVL (7 mil. EUR)
Expected implementation time
Year 2010-2013

Action 3 – Renovation of Umurga DH network
Proposal includes renovation of existing DH network in Umurga village.
Current state
The heat is generated in boiler house with total capacity 1,3 MW and sawdust as fuel is used. Annual fuel consumption is approx.1500 t. DH network pipes are obsolete, some pipes inside channels are often flooded and heat losses in distribution are up to 35%. Umurga municipality perceives the need for installation of new pre-insulated pipes instead of old ones to decrease the fuel consumption and costs for heat production.
Technological solution
The proposed technological solution for renovation of existing DH network is replace existing old pipes with new pre-insulated pipes. Additionally individual heat substations in consumer buildings are planned to install.
Investors
The main investor is Umurga municipality.
Benefiting groups
The benefiting groups are: • Umurga municipality • Heat consumers
Financing
The financing could be provided by the Umurga municipality from the planned investment budget. Some part of the investment (up to 40%) is envisaged to be received as support from Operational Programme Infrastructure and Services 2007-2013.
Expected investment costs
Approx. 132 thous.LVL (190 thous. EUR)
Expected implementation time
Year 2008-2010

Action bundle 4 – Energy efficiency in multi-apartment buildings in Ainaži city
Proposal includes implementation of energy efficiency measures in multi-apartment buildings in Ainaži city, e.g., thermal insulation of walls, roofs, and basements, and other energy efficiency measures.
Current state
According the high interest of Ainaži municipality stakeholders in promoting energy efficiency in inhabitant's buildings, energy efficiency possibilities are investigated and proposed in Ainaži city multi-apartment buildings. However, other municipalities are facing the same problems, thus experiences from those projects could be easily transmitted to other municipalities. There are 7 multi-apartment buildings located in Ainaži city. All of them are private buildings. Utility Department of Ainaži municipality provides water/wastewater and solid waste management, but heating is provided by building owners from separate boiler houses or from boilers installed in the basement of buildings (local heating systems). Ainaži municipality has supported energy efficiency measures in some multi-apartment buildings by giving subsidy of 2000 Lats (approx. 2850 EUR). In this project is planned to bundle several multi-apartment building thermal insulation projects, including installation of heat substations and heat meters.
Technological solution
The first step is to develop the energy audits in buildings and after that the packages of energy savings measures identified in the energy audits could be defined. This package will consist of thermal insulation of the buildings, reconstruction of windows and doors, improvement of efficiency of heating sources and heating systems, energy efficient lighting systems etc.
Investors
The main investors will be building owners.
Benefiting groups
The benefiting groups are: • Building owners and inhabitants
Financing
The financing could be provided by building owners with support of Ainaži municipality. One of the solutions how the municipality could support the building owners is the development of energy efficiency fund where building owners can apply for financing. Some part of the investment is envisaged to be received as support from Operational Programme Infrastructure and Services 2007-2013.
Expected investment costs
Approx. 61 thous.LVL (87 thous. EUR) for one building
Expected implementation time
Year 2010-2013

4. Action Bundle 1: Fuel switching and solar collector installation

The four energy actions presented in Chapter 3.3 will be developed in 6 separate steps.

4.1 Step 1: Technical pre-feasibility

The aim of the project is to replace existing light fuel oil boilers with new wood pellet boilers. To reduce the fuel consumption, it is planned to install the solar collector on one of the consumers building – on the roof of kindergarten.

Now in the existing boiler house two boilers Pironox LR-NT-700 are installed with capacity of 0.7 MW each, in total 1.4 MW. Present annual fuel consumption is about 180 t. Existing calculated heat load is 0.8 MW.

In kindergarten, where the installation of a solar system is planned, the annual hot water consumption is about 500 m^3.

1) Main characteristics of the new heating system

- Heat production equipment – wood pellet boiler

  Specification:

Installed Capacity, MW	1.0
Annual Heat Generation, MWh	4800
Annual Fuel Consumption, m^3	6000

- Solar collectors in area of 20 m^2, energy production 6 MWh per year with accumulation storage tank.

2) Sale of Heat

After implementation of project, heat consumers will be the same - school building, kindergarten and sport complex. The hot water load will be partly covered by heat accumulated using solar collectors. In future heating system will be enlarged because of connecting a new sports hall and swimming pool.

After fuel switch there will be need for additional building, where new boilers will be installed and wood pellets will be stored.

Potential technology provider is local wood pellet boiler producing company “Grandeg”. Their boiler technology is already proven in Latvia market and is widely used as well in Limbaži region.

The boiler house is located in Salacgrīva city center. Depending on fuel price and transportation costs fuel can be supplied as well form Limbaži region, as from other neighboring regions. For transportation it is possible to use road cargo transport or see transport. On production site there are available all the necessary production inputs, like electricity, water and wastewater connections. Regarding potential emissions, the most important benefits are elimination of CO_2 emissions from fossil fuel burning and reduction of emissions from light fuel oil storage and handling operations. The overall environmental impact will be reduced.

The total amount of pellets needed is about 515 t/year. Wood pellet availability is good enough; however, the fuel price is tending to grow every year.

It is possible to provide additional training for existing employees to get qualified labor for the new boiler house.

4.2 Step 2: Energy balance

Total energy consumption in Salacgrīva municipality public buildings local heating system is expected to be about 2320 MWh, of which 100% is being consumed by public sector. Wood pellets will cover 99.8% of energy production and 0.2% will be covered by solar energy.

Expected savings of fossil fuels and reduction of GHG emissions – Light fuel oil savings 180t (7670 GJ), what represents savings of 568 t CO_2 emissions per year.

Logistics – Wood pellets will be supplied from local pellet producers (companies in Limbaži region or other neighboring companies).

4.3 Step 3: Financing concept

Investment Cost:

New pellet boilers (2 x 0.5 MW)	86 800 EUR
Pellet storage silos	42 700 EUR
Fuel supply system	9 250 EUR
Other equipment	39 850 EUR
Construction of new building	35 500 EUR
Solar collector system	14 200 EUR
Other costs	53 535 EUR

Project Preparation Expenses:

Project preparation expenses include feasibility studies and energy audits, preparation of application for financing (e.g., EU Structural/Cohesion funding), premiums and administration fees. This expenses is estimated approximately 5 % from total investment cost and is calculated about 14 000 EUR.

Financial Engineering:

Total investment
282 000 Euro

Private Funding		Public Funding	
0 Euro		282 000 Euro	
Equity	Commercial loan	SF/CF	Investment budget of Salacgrīva city
0 Euro	0 Euro	141 000 Euro	141 000 Euro

Project life time	20 Years

Economic Analysis:

Economic analysis was calculated using 7% discount rate and 1.5% prices escalation rate.

Results of economic analysis without subsidy from Structural Funds (OP Infrastructure and Services):

Net Present Value (NPV)	120	thous. EUR
Internal Rate of Return (IRR)	11.8	%
Profitability indicator (PI)	42	%
Simple payback	8.4	years
Real (discounted) payback	11.6	years

Results of economic analysis with 50% subsidy from Structural Funds (OP Infrastructure and Services):

Net Present Value (NPV)	261	thous. EUR
Internal Rate of Return (IRR)	25.2	%
Profitability indicator (PI)	92	%
Simple payback	4.2	years
Real (discounted) payback	4.9	years

Please see the project cash flow in *Annex 1*.

4.4 Step 4: Positive effects in view to overall energy vision

As the result of project implementation, environmental impact will be reduced through and the use of renewable energy. This will improve air quality and reduce energy production expenses. This project is covering at least two priorities defined in Limbaži region energy vision, including efficient heat production and increased use of renewable and local waste energy. Installation of solar collectors will promote awareness of local people for better understanding of possibilities to use renewable energy and solar energy for hot water preparation.

4.5 Step 5: Cooperation scheme

In this project two different activities are bundled – reconstruction of existing boiler house and installation of solar collectors on kindergarten building. The bundling initiator is the municipality who is the owner of boiler house and kindergarten.

Different consulting companies can be selected for development of energy audit, feasibility studies, funding application and other relevant documentation.

4.6 Step 6: Strategy for financing Energy Actions by Structural Funds

This project is eligible for receiving support from Operational Program "Infrastructure and Services" 5th priority "Promotion of Environmental Infrastructure and Environmentally Friendly Energy". The following steps are necessary for successful submission of application:

Until end of 2007:

- Decision of the Salacgrīva city council to follow on in the development of project and application for support from EU funding;
- Tender for Energy audits and for feasibility study;
- Development of energy audit and project feasibility study;
- Design of financing scheme (based on feasibility study) and decision if to select own capital, bank loan or their combination.

2008:

- Tender for application for support from OP Infrastructure and Services;
- Development of application for support from OP Infrastructure and Services;
- Development and submission of application for construction permits and development of project documentation;
- Submission of application depending on conditions of relevant Call for applications, evaluation of the application;

2008 – 2009:

- Tenders for suppliers, implementation of project actions;

2010:

- End of implementation of the project bundle.

5. Energy Action 2: Biomass CHP Plant

5.1 Step 1: Technical pre-feasibility

The aim of the project is to install a biomass cogeneration unit in the existing boiler house in Limbaži city.

5.1.1 Detailed technical project description

District heating system of Limbaži consists of two boiler houses. There is connection between both boiler houses to provide hot water from one boiler house to both systems in summer season. Cogeneration unit is planned to build in existing boiler house in Cēsu Street. Currently there are two wood chips boilers DKVR 6.5-13 and one heavy fuel oil boiler for covering peak loads. The capacity of wood boilers is 4 MW each, in total 8 MW, and heavy fuel oil boiler capacity is 4.5 MW.

Present annual wood chips consumption is about 20 500 t, heavy fuel oil consumption – 100 t. Maximal calculated heat load is 11 MW and hot water load is about 2 MW. Total load, including heat losses in distribution network is calculated 14 MW.

1) Main characteristics of the new CHP Plant

- Small-scale cogeneration plant – e.g., steam turbine technology
- Electricity supply – the general grid

Specification:

Installed Capacity, MWe	2.0
Installed Capacity Utilization Coefficient	1
Number of Installed Capacity Utilization Annual Hours, (h)	7000
Annual Electricity Generation, mln. kWh	14
Minimum Daily Electricity Generation, mil kWh	0.048

2) Sale of Electricity

Electricity could be sold to Joint Stock Company “Sadales Tīkls” (JSC “Distribution Network”). Distribution Network is responsible for an essential stage of long lasting power supply to users – supply of electricity as a product to each particular user. The company provides electric power supply to more than one million electric power users, and its service covers more than 99% of the territory of Latvia.

5.1.2 Availability and suitability of site

Cogeneration unit can be installed in the existing building of boiler house. To operate the plant, there will be need for new steam boilers. Technology providers could be found only after elaboration of technical project of new cogeneration plant.

The potential cogeneration plant is located in Limbaži city center. Biomass – wood chips suppliers could be the same as for existing boiler house. For transportation it is possible to use road cargo transport only.

On production site there are available almost all the necessary production inputs, like electricity, water and wastewater connections. Additional connection to electricity grid will be needed to sell produced electricity.

Regarding potential emissions, the most important benefits are elimination of CO_2 emissions by using cogeneration to produce heat and electricity at the same time. The overall environmental impact will be reduced.

5.1.3 Raw materials

The total amount of wood chips needed is 26 500 t/year. Wood chips availability is good enough; however, the fuel price is tending to grow every year.

It is possible to provide additional training for existing employees to get qualified labor for the new cogeneration plant.

5.2 Step 2: Energy balance

The total energy production in Limbaži municipality new CHP is expected to be about 81 700 MWh, of which 80% is being consumed by households and 20% by public sector. Wood chips will cover 100% of energy production.

Expected fuel savings and GHG emissions reductions – Heavy fuel oil savings 175 t (7105 GJ), what represents savings of 545 t CO_2 emissions.

Logistics – Wood chips will be supplied from existing suppliers from Limbaži region as well form neighboring regions.

5.3 Step 3: Financing concept

Investment Cost:

Estimated project investment cost is approx. 7 mil.EUR.

It includes the installation of 2 MW_{el} cogeneration unit and 14 MW_{th} wood chip boilers.

Project Preparation Expenses:

Project preparation expenses include feasibility studies, energy audits and preparation of application for financing (e.g., EU Structural/Cohesion funding), premiums and administration fees. This expenses is estimated approximately 3 % from total investment cost and is calculated about 210 000 EUR.

Financial Engineering:

Total investment
7 000 000 Euro

Private Funding – DH company "Limbažu Siltums"		Public Funding	
1 750 000 Euro		5 250 000 Euro	
Equity	Commercial loan	SF/CF	Investment budget of Limbaži city
525 000 Euro	1 225 000 Euro	3 500 000 Euro	1 750 000 Euro

Power station life time	25 Years

Economic Analysis:

Economic analysis was calculated using 7% discount rate and 1.5% prices escalation rate.

Results of economic analysis without subsidy from Structural Funds (OP Infrastructure and Services):

Net Present Value (NPV)	99	thous. EUR
Internal Rate of Return (IRR)	7.1	%
Profitability indicator (PI)	1	%
Simple payback	13.3	years
Real (discounted) payback	24.3	years

Results of economic analysis with 50% subsidy from Structural Funds (OP Infrastructure and Services):

Net Present Value (NPV)	3599	thous. EUR
Internal Rate of Return (IRR)	16.2	%
Profitability indicator (PI)	51	%
Simple payback	6.7	years
Real (discounted) payback	8.5	years

Please see the project cash flow in *Annex 2*.

5.4 Step 4: Positive effects in view to overall energy vision

As the result of project implementation will be reduced environmental impact through elimination of fossil fuel and use of renewable energy. This will improve the air quality as well as reduce energy production expenses. This project is covering at least two priorities defined in Limbaži region energy vision, including efficient heat production and increased use of renewable and local waste energy.

5.5 Step 5: Cooperation scheme

A large cooperation scheme in this case is not necessary. The main project actors will be the project developer and selected consulting company providing a support in development application and other necessary documents (e.g. energy audits, feasibility study, funding application).

5.6 Step 6: Strategy for financing Energy Actions by Structural Funds

This project is eligible for receiving support from Operational Program “Infrastructure and Services” 5th priority “Promotion of Environmental Infrastructure and Environmentally Friendly Energy”. The following steps are necessary for successful submission of application:

Until end of 2007:

- Decision of the Limbaži city council and DH company “Limbažu Siltums” to follow on in the development of project and application for support from EU funding;
- Tender for feasibility study;

- Development of project feasibility study;
- Design of financing scheme (based on feasibility study) and decision if to select own capital, bank loan or their combination.

2008:

- Tender for application for support from OP Infrastructure and Services;
- Development of application for support from OP Infrastructure and Services;
- Development and submission of application for construction permits and development of project documentation;
- Submission of application depending on conditions of relevant Call for applications, evaluation of the application;

2008 – 2010:

- Tenders for suppliers, implementation of project actions;

2011:

- End of implementation of the project.

6. Energy Action 3: Renovation of District Heating network

6.1 Step 1: Technical pre-feasibility

The aim of the project is to renovate the existing district heating network in Umurga village.

6.1.1 Detailed technical project description

The length of existing DH network is about 830 m. 4-pipe system are used and the system has never been reconstructed since the installation in 1970-ties. Those pipes are connecting the boiler house with heat and hot water consumers. Consumers include municipality building, two 18-apartment buildings, kindergarten, dispensary, shop and one 8-apartment building. The last two have only hot water supply. The boiler house capacity is 1.3 MW and sawdust as fuel is used. The present annual fuel consumption is 1500 t.

1) Main characteristics of the new DH network

- Pipes – new pre-insulated
- 7 new heat substations in consumer buildings

New pipe specification:

Total length, m	1660
Incl. D = 114.3 mm	450
Incl. D = 88.9 mm	1210
λ , W/(m K)	0,027

After renovation of DH network, there will be need for installation of heat substations in consumer buildings.

Potential technology providers could be found only after the elaboration of technical project.

6.1.2 Availability and suitability of site

The DH system is located in the center of Umurga village. On project site there are available all the necessary production inputs, like electricity, water and wastewater connections. Regarding environmental impact, the most important benefits are reduced heat losses and elimination of air emissions.

After renovation the total reduction of heat losses in heat transmission is calculated 650MWh/year.

6.2 Step 2: Energy balance

Total energy consumption in Umurga DH system is expected to be about 12 000 GJ, of which 70% is being consumed by public sector and 30% by households. Sawdust will cover 100% of energy production. After the renovation heat losses in heat transmission will be reduced from 35% to 17%.

Expected fuel savings is 215 t (3335 GJ), what represents savings of 360 t CO_2 emissions.

Logistics – fuel will be supplied from existing suppliers.

6.3 Step 3: Financing concept

Investment Cost:

Estimated project investment cost is 188 thous.EUR.

Remove of old pipes	17 075 EUR
Digging works	17 800 EUR
New pre-insulated pipes	49 800 EUR
Installation of new pipes	14 200 EUR
Building works	700 EUR
Improvement measures	22 750 EUR
Other works	5 700 EUR
Installation of 6 heat substations	60 000 EUR

Project Preparation Expenses:

Project preparation expenses include feasibility studies, energy audits and preparation of application for financing (e.g., EU Structural/Cohesion funding), premiums and administration fees. This expenses is estimated approximately 3 % from total investment cost and is calculated about 6000 EUR.

Financial Engineering:

Total investment
188 000 Euro

Private Funding		Public Funding	
0 Euro		188 000 Euro	
Equity	Commercial loan	SF/CF	Investment budget of Umurga municipality
0 Euro	0 Euro	75 000 Euro	113 000 Euro

Project life time	25 Years

Economic Analysis:

Economic analysis was calculated using 7% discount rate and 1.5% prices escalation rate.

Results of economic analysis without subsidy from Structural Funds (OP Infrastructure and Services):

Net Present Value (NPV)	5	thous. EUR
Internal Rate of Return (IRR)	7.2	%
Profitability indicator (PI)	2.0	%
Simple payback	18.8	years
Real (discounted) payback	24.0	years

Results of economic analysis with 40% subsidy from Structural Funds (OP Infrastructure and Services):

Net Present Value (NPV)	80	thous. EUR
Internal Rate of Return (IRR)	12.6	%
Profitability indicator (PI)	42	%
Simple payback	11.3	years
Real (discounted) payback	12.5	years

Please see the project cash flow in *Annex 3*.

6.4 Step 4: Positive effects in view to overall energy vision

As the result of project implementation will be reduced environmental impact through elimination of energy losses from DH network pipes. This will indirectly improve the air quality and as well as reduce energy production expenses. This project is in line with one of the priorities defined in Limbaži region energy vision – promotion of efficient heat production.

6.5 Step 5: Cooperation scheme

A large cooperation scheme in this case is not necessary. The main project actors will be the project developer and selected consulting company providing a support in development of energy audit and funding application.

6.6 Step 6: Strategy for financing Energy Actions by Structural Funds

This project is eligible for receiving support from Operational Program "Infrastructure and Services" 5th priority "Promotion of Environmental Infrastructure and Environmentally Friendly Energy". The following steps are necessary for successful submission of application:

Until end of 2007:

- Decision of the Umurga municipality to follow on in the development of project and application for support from EU funding;
- Tender for energy audit and project economical evaluation;
- Development of energy audit and economical evaluation;
- Design of financing scheme (based on energy audit and economical evaluation) and decision if to select own capital, bank loan or their combination.

2008:

- Tender for application for support from OP Infrastructure and Services;
- Development of application for support from OP Infrastructure and Services;
- Development and submission of application for construction permits and development of project documentation;
- Submission of application depending on conditions of relevant Call for applications, evaluation of the application;

2008 – 2009:

- Tenders for suppliers, implementation of project actions;

2009:

- End of implementation of the project.

7. Action Bundle 4: Energy efficiency Measures in Multi-Apartment Buildings

7.1 Step 1: Technical pre-feasibility

The aim of the project is the implementation of energy efficiency measures in multi-apartment buildings in Ainaži city.

There are 7 multi-apartment buildings located in Ainaži city. Overview of the buildings and their local heating systems is given in table below.

Address	Fuel	Annual fuel consumption, m^3	Heating area, m^2	Calculated specific heat consumption, kWh/m^2
Valdemāra Street 93	Wood logs	600	1506	185
Kr.Barona Street 3	Wood logs	200	1175	140
Kr.Barona Street 7-1	Wood logs	n/a	n/a	n/a
Kr.Barona Street 7-2				
Kr.Barona Street 9	Wood logs	1200	1200	185
Kr.Barona Street 10			1200	185
Kr.Barona Street 12			1200	170

From these, 3 buildings have insulated end-walls, but at the same time specific heat consumption is still too high.

Main characteristics of the new insulated building:

- Specific heat consumption – 100 – 70 kWh/m^2

Before starting the project there it is suggested to carry out an energy audit in building. The energy audit will identify the potential energy efficiency measures, give an overview of priorities and payback periods as well will calculate the potential savings.

Potential energy audit providers are consultant companies. Potential construction work providers could be found only after elaboration of technical specification of insulation project.

Regarding environmental impact, the most important benefit will be reduction of fuel consumption and elimination air emissions.

7.2 Step 2: Energy balance

After project implementation it will be possible to reduce specific heat consumption by up to 50%.

Expected fuels savings in Ainaži multi-apartment buildings – Wood logs savings 1000 m^3 (4176 GJ).

7.3 Step 3: Financing concept

Investment Cost:

Project investment costs are function of the planned energy efficiency measures and number of buildings included in project bundle.

Estimated project investment cost for one building is 87000 EUR in case of full set of energy efficiency measures except changing the windows.

Project Preparation Expenses:

Project preparation expenses include energy audits and preparation of application for financing. This expenses is estimated approximately 3 % from total investment cost and is calculated about 2600 EUR.

Financial Engineering:

Total investment			
87 000 Euro			
Private Funding		Public Funding	
54 250 Euro		32 750 Euro	
Equity	Commercial loan	SF/CF	Subsidy from Ainaži municipality EE Fund
16 275 Euro	37 975 Euro	21 750 Euro	11 000 Euro

Project life time	20 Years

Economic Analysis:

Economic analysis was calculated using 7% discount rate and 3.0% prices escalation rate.

Results of economic analysis without subsidy from Structural Funds (OP Infrastructure and Services):

Net Present Value (NPV)	-21	thous. EUR
Internal Rate of Return (IRR)	-	
Profitability indicator (PI)	-24	%
Simple payback	19.0	years
Real (discounted) payback	35.1	years

Results of economic analysis with 25% subsidy from Structural Funds (OP Infrastructure and Services) and 11 000 EUR subsidy from municipality energy efficiency fund:

Net Present Value (NPV)	1	thous. EUR
Internal Rate of Return (IRR)	7.1	%
Profitability indicator (PI)	1	%
Simple payback	13.6	years
Real (discounted) payback	19.6	years

Please see the project cash flow in *Annex 4*.

7.4 Step 4: Positive effects in view to overall energy vision

As the result of project implementation will be reduced environmental impact through elimination of energy losses from buildings. This will improve the air quality as well as reduce energy production expenses. This project is under the priority – efficient use of energy in both new and existing buildings defined in Limbaži region energy vision.

7.5 Step 5: Cooperation scheme

In this project different activities (different buildings) can be bundled. The bundling initiators are building owners. In this case municipality can support the energy efficiency projects by developing the energy efficiency fund, where building owners can apply for funding.

Different consulting companies can be selected for development of energy audits, financial calculations and funding application.

7.6 Step 6: Strategy for financing Energy Actions by Structural Funds

This project is eligible for receiving support from Operational Program “Infrastructure and Services” 4th priority “Quality Environment for Life and Economic Activity”. The following steps are necessary for successful submission of application:

Until end of 2007:

- Decision of the Ainaži city council to establish energy efficiency fund and development of conditions for funding.
- Decision of building owners to follow on in the development of project and application for support from EU funding;
- Development of energy audits;
- Design of financing scheme (based on energy audit and economical evaluation) and decision if to select own capital, bank loan or their combination.

2008 - 2009:

- Development of applications for support from different State programs (if relevant);

2010:

- Development of applications for support from OP Infrastructure and Services;
- Submission of application depending on conditions of relevant Call for applications, evaluation of the application;
- Tenders for suppliers, implementation of project actions;
- End of implementation of the project.

8. Conclusion and Outlook

The elaborated Master Plan is the first such a comprehensive energy planning document for Limbaži region as well as for any other specific region in Latvia.

One of the most important parts in developing the Master Plan is the evaluation of existing energy situation. The main problem in this working step was a lack of statistical and energy data at regional level. To ensure a possibility for updating the elaborated Master Plan on regular basis, it is strongly recommended to develop the system for collection of energy statistics in regional level and keep it up-to date.

The investigation of existing situation has showed that in heat generation mainly wood fuel is used, but there is a huge potential to improve the energy efficiency of wood fuel systems and used equipment. Electricity generation in the region is negligible compared to regional electricity consumption. Therefore it is necessary to increase the number of electrical power or CHP generation facilities in order to eliminate the dependency from other regions.

The highest energy saving potential is estimated in housing sector, where implementation of energy efficiency measures can save energy up to 100 000 MWh/year. Significant energy saving potential is estimated also in existing district heating systems – in heat production sites as well as in distribution networks. Regarding the renewable energy potential, the highest potential is identified for biomass resources – basically wood fuel. Good potential is also for wind energy and solar energy projects.

To promote the development of Limbaži region in line with the priorities set up by Limbaži region energy vision, four specific energy actions – pilot projects have been identified. Those projects are made to be feasible for receiving support from European Structural and Cohesion Fund Operational Program starting from 2007.

Four different energy actions/action bundles were proposed. The first one is fuel switch project from light-fuel oil to wood pellets with installation of solar collectors for hot water preparation. The second proposed project is the development of biomass CHP plant. Both projects are promising and after some basic financial calculations the payback time for those projects is between 5 to 8.5 years (including the subsidy form Structural Funds).

The third project is related to district heating network renovation. This project is very necessary from the technical point of view (the old heating network is in emergency condition). In financial calculations it was assumed that sawdust price in the future will

increase significantly, otherwise the project will not be economically feasible and without some additional subsidy it will not be eligible for receiving the support from Structural Funds.

The last proposed project is related to energy efficiency in multi-apartment buildings. Preliminary financial calculations show that these projects require some additional subsidy from other funding sources, e.g., municipal energy efficiency fund, to become profitable. At the moment it is not possible to investigate the possibility for receiving the support from Structural Funds because the project evaluation criteria for this activity is not elaborated yet.

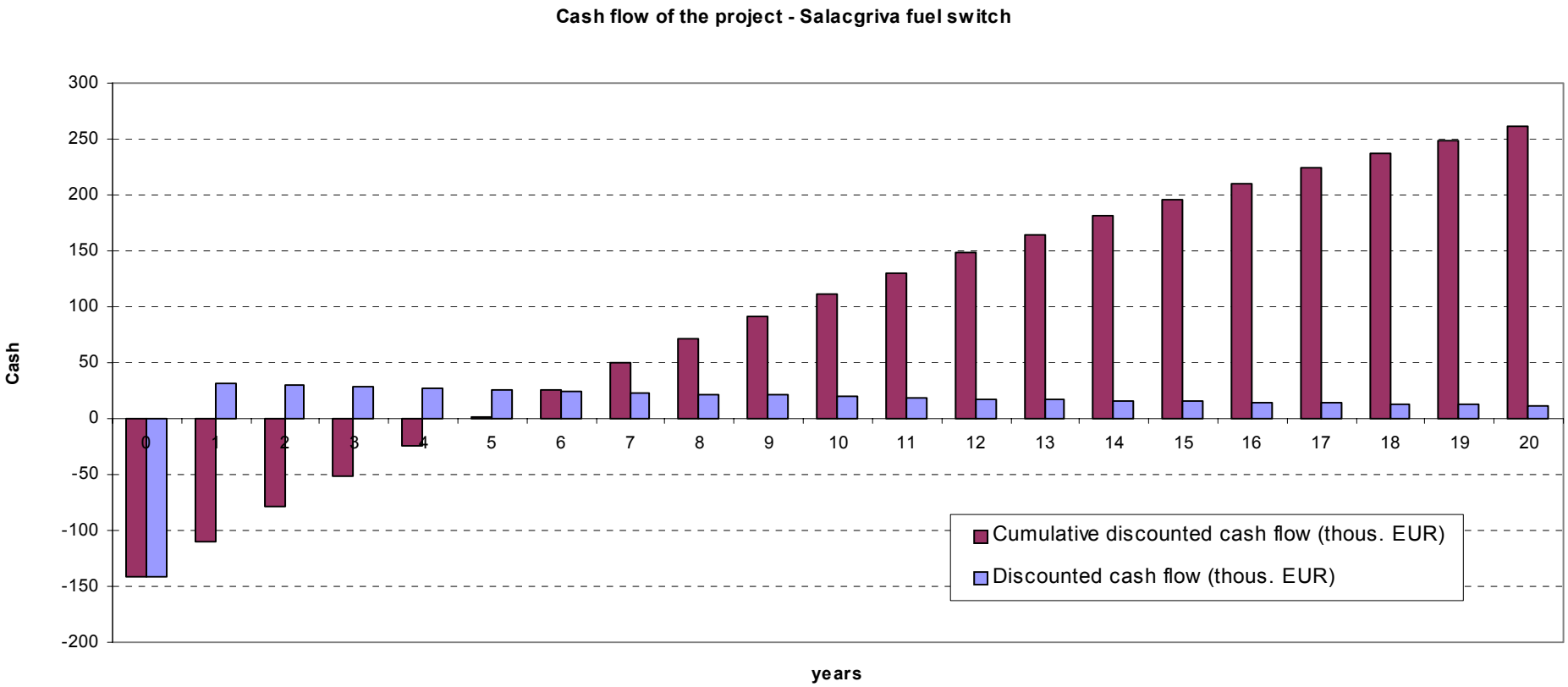
The Master Plan for Limbaži region elaborated in the frame of project “Energy 4 Cohesion” is a very good starting point for providing the sustainable energy management in Limbaži region. This could serve as basis for further work of regional administration and other stakeholders in this field. The next steps include a comprehensive feasibility study on the selected projects, elaboration of energy audits and elaboration of applications to apply for European funding.

Finally, it is very important to evaluate the outcomes of Master Plan and to keep update this document in regular basis.

Annexes

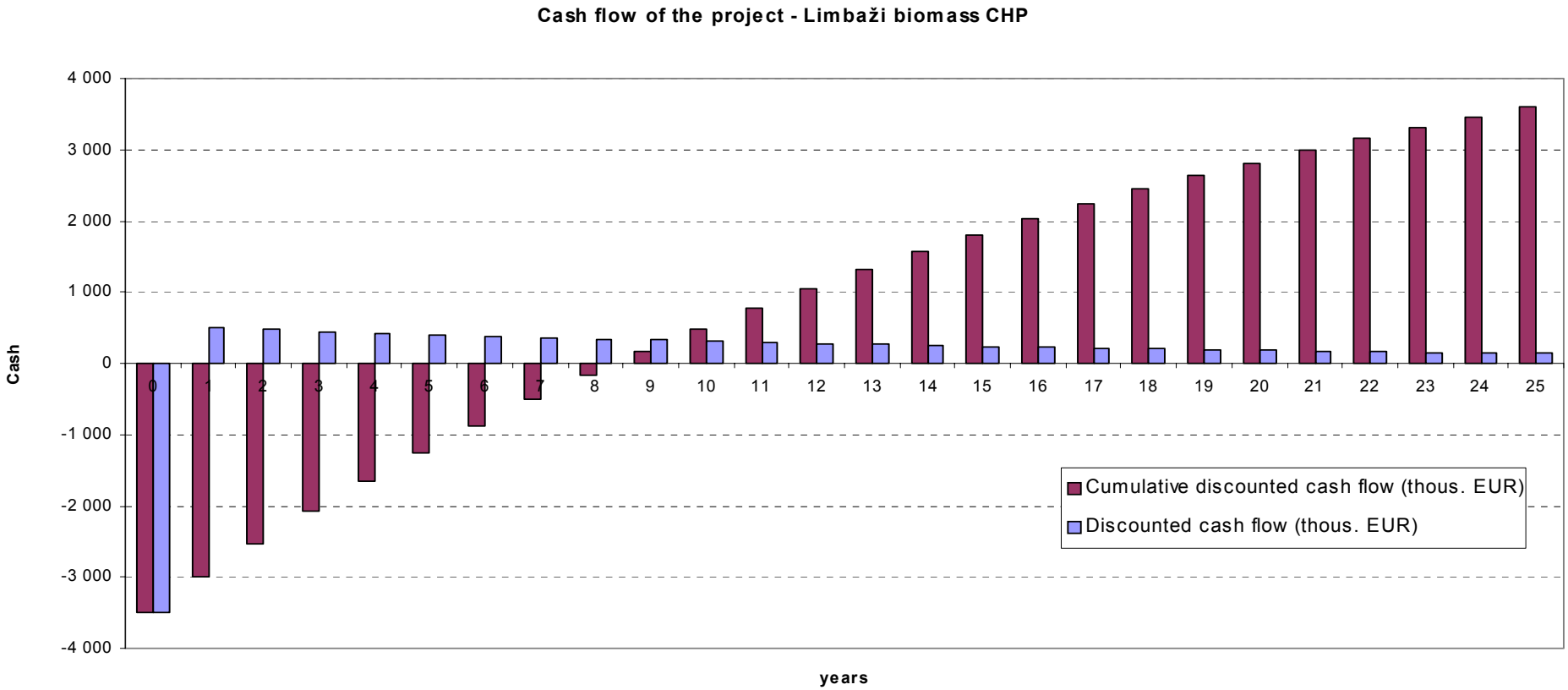
- Annex 1: Cash flow for Salacgrīva fuel switch project (Action Bundle 1)
- Annex 2: Cash flow for Limbaži Biomass CHP project (Energy Action 2)
- Annex 3: Cash flow for Umurga DH network renovation project (Energy Action 3)
- Annex 4: Cash flow for Ainaži multi-apartment building thermal insulation project (Action bundle 4)
- Annex 5: Energy 4 Cohesion Poster
- Annex 6: Energy 4 Cohesion Project Presentation

Annex 1. Cash flow for Salacgrīva fuel switch project (Action Bundle 1)



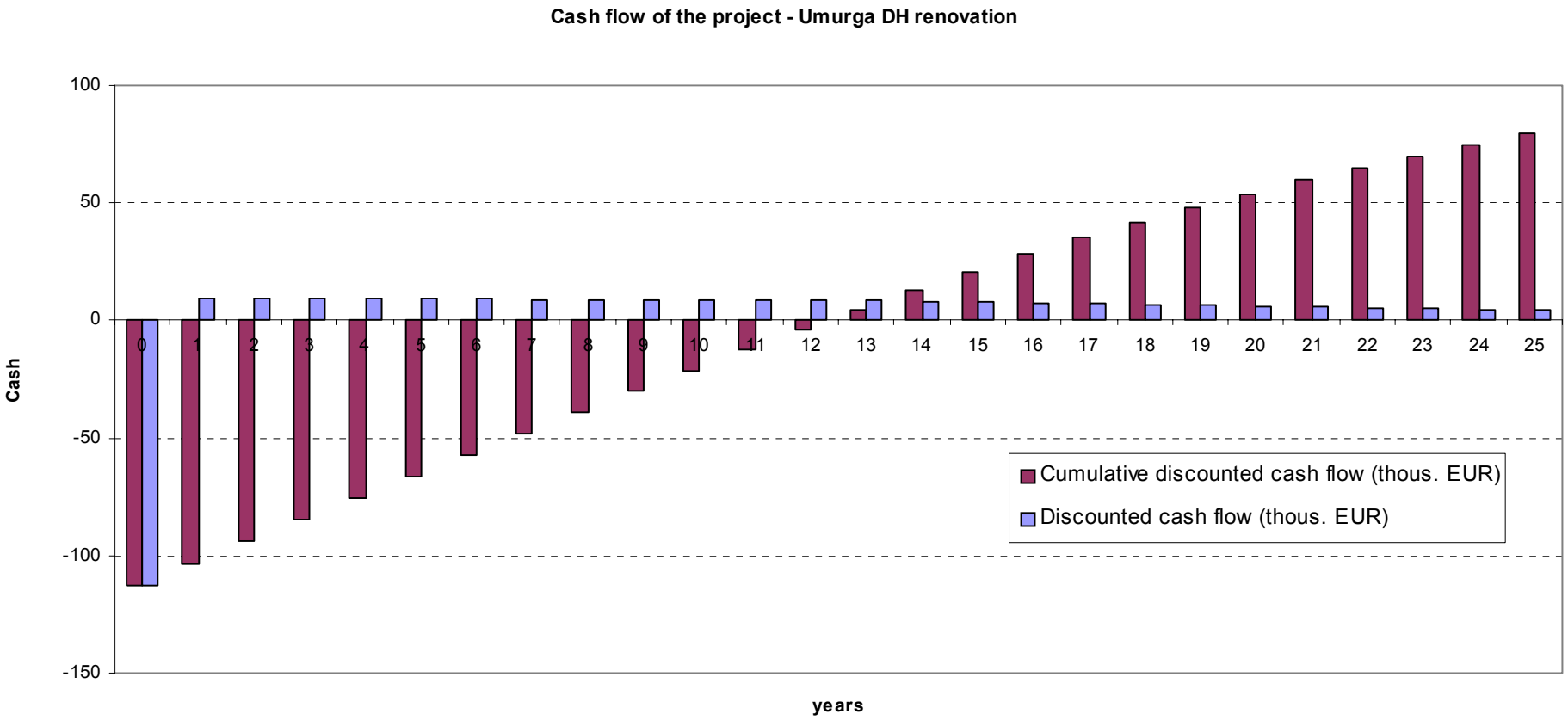
Cash flow including 50% subsidy from SF/CF

Annex 2. Cash flow for Limbaži Biomass CHP project (Energy Action 2)



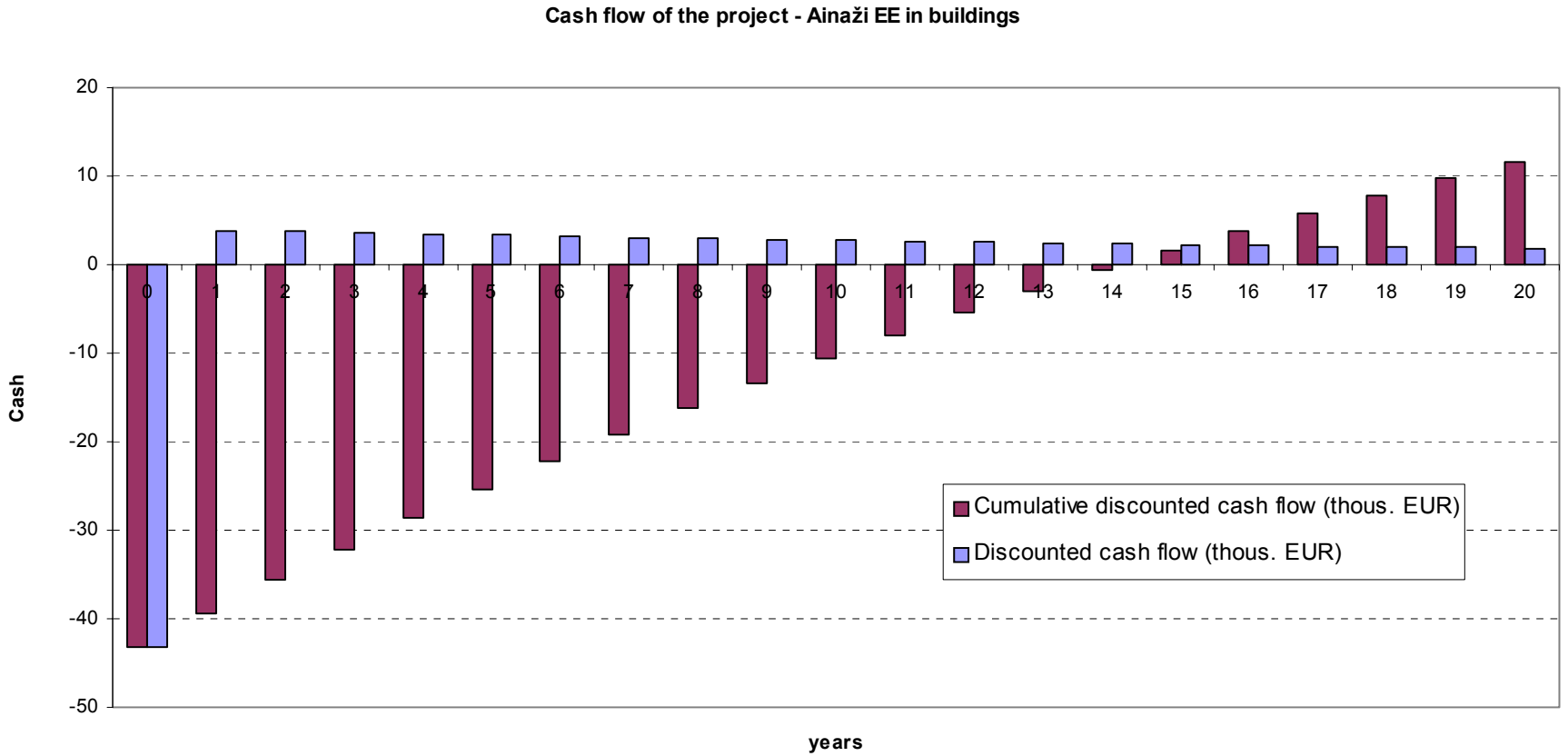
Cash flow including 50% subsidy from SF/CF

Annex 3. Cash flow for Umurga DH network renovation project (Energy Action 3)



Cash flow including 40% subsidy from SF/CF

Annex 4. Cash flow for Ainaži multi-apartment building thermal insulation project (Action bundle 4)



Cash flow for insulation of one building, including 25% subsidy from SF/CF and 12,5% subsidy from municipal energy efficiency fund

Annex 5: Energy 4 Cohesion Poster

Annex 6: Energy 4 Cohesion Project Presentation