

Finnish Ministry of the Environment

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**ESTONIAN CONCRETE
RESIDENTIAL BUILDINGS:
THE COSTS OF AND THE
PRECONDITIONS FOR RENOVATION**

**EXECUTIVE SUMMARY OF
THE ESTONIAN AND
FINNISH FINAL REPORTS
17.10.2005**



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TALLINNA TEHNILIKAKOOL
TALLINN UNIVERSITY OF TECHNOLOGY

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1. Introduction

The future of the old concrete element blocks of flats has been, and still is, under discussion both in Estonia and in Finland. In Estonia, under discussion are mainly the various renovation options, although it has even been suggested that the buildings should simply be demolished. For example in Tallinn the major suburbs of Õismäe, Lasnamäe and Mustamäe were built between 60's and 80's. Almost regardless of the age, most of the usually 5-9 storey buildings from the soviet era are facing similar issues due to bad technical and construction practices as well as poor quality of the materials used. After some initial hesitation after the newly gained independence, in recent years the Estonians have started renovating the buildings, especially in and around Tallinn.

After Estonia's new independence, there has been extensive co-operation between Finland and Estonia in the renovation of block of flats. This project continues this co-operation and has been carried out by Tallinn University of Technology and AX Consulting / Axovaatio Ltd (Finland). Estonian engineering consultancy company Aksiaal OÜ has brought valuable practical experience.

The work has been financed by Finnish Ministry of the Environment, and has been supervised by Ms Laila Hosia, who has offered many helpful comments and views. The project has been led by Professor Kaido Hääl of Tallinn University of Technology and Mr Teuvo Aro of Axovaatio Ltd.

The aim of this work was to look at renovation costs of a typical Estonian soviet era block of flats and find out how heavy a financial burden these would be for the individual residents, and to Estonia as a whole.

2. Renovation of a typical Estonian concrete block of flats

One very common type of soviet era building is a 5-storey 4-staircase building with a total of around 60 flats. There are hundreds of blocks of flats like this, or almost similar, in Estonia, so this has been used as an exemplar when estimating the renovation costs in this report. Further details on the building can be found in Appendix 1. [1,2,3,4]

Based on the known problems of the soviet era concrete element blocks two renovation packages have been suggested. The basic package is a kind of minimum solution designed to halt the deterioration of the building while the more substantial package will bring the state of the building closer to a more modern one. The table below shows the renovation measures included in the two packages.

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	Basic package	Comprehensive package
New shut-off and balancing valves in the basement	X	
New piping and valves in the basement		X
New radiators, thermostatic valves and replacing one-pipe system with a two-pipe system		X
Domestic hot and cold water pipes replaced by plastic or copper ones	(X)	X
New taps, showers and toilet seats		X
Roof (inclination, bitumen polymer sheeting)	X	X
Insulation of the gables	X	X
New windows		X
Repair and painting of old windows	X	
New balcony doors	X	X
Repair of the balcony (slabs and rails)		X
New entrance doors	X	X
Repair and painting of the staircases		X
Insulation of the long walls (front and back)		X
Repair of the concrete element joints on the long walls	X	
Repair of the basement windows	X	X
Insulation of the floor on the ground floor (basement ceiling)	X	X
Fitting radiators in the basement	X	X

(X)= should be added to the basic package if pipe leakages likely

No measures for air conditioning, drainage or power supply system are suggested. A cheap way to improve air conditioning would be to install fans on top of the exhaust hoods on the roof. However, the duct walls inside the building are often in such a poor condition that a negative pressure high enough cannot be produced by the fans. Thus, the ducts would have to be replaced, or a method to make them more airtight be found. A central air handling unit might be an option, but is a complex and expensive one. The most feasible solution would probably be a separate heat recovery ventilator in each flat. However, these tend to take up quite a lot of space, which might not be welcomed in reasonably small flats. Drainage and power supply are usually not considered to be a problem.

The 2004-2005 prices for the renovation operations are arrived at as follows:

- the 2003 price (in euros) in Finland (without VAT) is split into materials and labour costs, which are then updated to current prices each with their own price index
- information is available on the relative building material and labour costs in Finland and Estonia and these are applied to the figures resulting from above, thus giving the current prices (in euros) in Estonia
- these are converted to Estonian kroons (EEK) and a VAT of 18% added
- various reference sources were used to double-check the figures and some slight amendments perhaps made

The prices are of course only approximate, with an accuracy of around $\pm 20\%$ as they do depend on the location of the building, availability and workload of expert manpower in the area etc.

Based on the two packages described in the table above the total cost of the basic package and the comprehensive package are 2,794,494 EEK and 8,814,732 EEK, respectively. Further 10% has been added to cover project planning and other costs, thus the total costs would be as follows:

	Total, EEK	Total per net dwelling area, EEK/m ²
Basic package	3,073,868	~970
Comprehensive package	9,696,205	~3,030

Note, 1 EEK = 0.064 €

3. Socio-economic situation in Estonia

Over 80% of the flats from the soviet era has been privatised, so funds for any renovation project have to come from the residents. A known problem with these buildings is that the wealth and income of the residents vary significantly. Thus, a renovation cost that for some would be perfectly feasible can be unbearable for others.

The table below shows the increase in monthly gross and net salaries in Estonia in recent years. Appendix 2 shows a more detailed table on the average salaries for various professions. There can be significant changes in salary during the year, e.g. for education and fishing the change from one quarter to another can be as much as 50%. [1], Note, 1 EEK \square 0.064 euros.

	Gross salaries EEK/month	Net salaries EEK/month
2000	4,876	3,820
2001	5,511	4,330
2002	6,110	4,743
2003	6,702	5,161
2004	7,223	5,499*

*January - September only

In 2004 the average disposable income per person was 36,348 EEK, i.e. a monthly average of 3,029 EEK. In Tallinn these figures were 42,940 EEK and 3,578 EEK, respectively [1]. The disposable income for individuals and families are determined by the net salaries, capital income and benefits, such as pensions, family benefits, unemployment allowances, subsistence benefits etc [8,9]. (More information on the various benefits can be found on the Estonian Ministry of Social Affairs web site, <http://www.sm.ee/eng/pages/index.html>).

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The consumer price index went up by 35% between 1997 and 2004, while housing costs increased clearly faster, by 61%. Consumer prices continue to rise, although the rate is now somewhat more moderate. The rate is higher for services than for goods. [1]

The construction price index rose by 39% from 1997 to the end of 2004. Labour costs went up significantly faster than material costs, the percentages were 67% and 28%, respectively. Repair and reconstruction work price index went up by about as much, by 38%, but the percentages for labour and material costs were slightly different, 70% and 22%, respectively. [1]

The GDP/PPP (purchasing power parity) per capita in Estonia is around 10,000 euros, which is just over 40% of the EU-25 average. Salaries have gone up faster than consumer prices, leading to increased purchasing power. The same trend is expected to continue in the next few years. [1,10,11]

When discussing renovation, and possible measures to be included, the price for construction of a new building has also to be looked at. Currently the price for a 55 m² flat in Lasnamäe, the cheapest suburb in Tallinn, is mostly in the region of 6,000-7,000 EEK/m². In the suburbs of Mustamäe and Õismäe prices are typically around the 10,000 EEK/m² mark. Outside Tallinn the prices can be significantly lower. In comparison, a newly built flat will typically cost around 23,000 EEK/m². The prices for new flats have been rising sharply, by roughly 20% a year. Prices for renovated flats in older buildings have also risen rapidly, although a little less steeply, by 15% a year. The rent for a ~50 m² flat is typically around 3,500-4,000 EEK/month. [1,2,12]

As seen from the figures above, the price range is wide. There are also areas with high net emigration, where the prices have collapsed due to lack of buyers.

One thing to be kept in mind when comparing the prices to those e.g. in Finland, is that the flats in Estonia are often fitted to a lower standard. Appliances like dishwasher or fridge-freezer, or even a cooker, are often not included. In older flats finding a place for these in the kitchen can sometimes be difficult.

When estimating the burden the renovation costs will place on the residents, service charge and other payments already paid by them have to be taken into account. Typically the service charge comprises of the following charges:

- 4-5 EEK/m² /month for routine maintenance, cleaning, communal lighting etc.
- 10-15 EEK/m² /month for heating and hot water
- 22 EEK/m³ of water for water and sewage charges

In addition, there might be a major works service charge to cover more extensive repair and refurbishment work. Typically this charge is 4-10 EEK/m² /month, depending e.g. on the location and the condition of the building. In practice, the maximum a resident working full-time can be expected to pay is around 20 EEK/m² /month but this

is often not feasible for those with lower income, especially unemployed or pensioners. Service charges are taken into account in subsistence benefits. So, this lightens the burden of the service charges for those with lower income. [2]

In 2004 the average expenditure per household member in Estonia was 33,590 EEK, in Tallinn this was 38,945. An average of 5,183 EEK was spent on housing, in Tallinn the figure was 6,615 EEK. The estimated minimum means of subsistence ("for stay alive") per 30 days per capita was 1,489 EEK, of which 696 EEK was for food. [1]

4. Financing a renovation project

At present home improvement loans are reasonably easy to get in Estonia. A typical loan period for major renovation projects is 10 years. Usually 10% self-financing is required. The maximum sum granted is often around 1,000 EEK/m². The interest rate varies, but is currently very low at around 3%. [2,13]

Usually, the client can choose between equal (annuity) and recessive monthly payment schedules. With annuity schedule, the monthly / yearly payments are fixed for the whole loan period. The share of the interest is higher at the start of the loan, thus the loan principal reduces more slowly at the beginning. Changes in interest rate can affect either the loan period or the size of the payment. In case of recessive monthly payments, the loan principal will be divided into equal parts for the entire loan period, and interest will be added. The sum being paid will reduce each month as the interest is calculated on the basis of the loan balance. For example for a 10-year loan, with 3% interest rate, the first yearly payment would be around 25% higher than the last. With similar terms, the total costs for the loan would be around 1% higher for the annuity option than for the recessive payment option.

In section 2, prices for two renovation packages were presented. The cost was found to be around 3.1 million EEK (~970 EEK/m²) for the basic package and around 9.7 million EEK (3,030 EEK/m²) for the comprehensive package. The 10% self-financing amount required would thus be 310,000 EEK (97 EEK/m²) and 970,000 EEK (303 EEK/m²), respectively. For the cheaper package, this could be collected quite easily (see section 3, major works service charge). The loan payments would also be manageable with a monthly payment of 10 EEK/m² (except for the first two payments if recessive monthly payment option was chosen, when 10.5 EEK would be required). On the other hand, the maximum loan is typically around 1,000 EEK/m², which would limit the amount of loan granted in case of the more expensive package. This means the residents / owner association would have to have considerable savings before applying for the loan. Thus, carrying out the whole comprehensive renovation project at one go is not a realistic option.

Potential savings resulting from the renovation measures have not been taken into account in the calculations above. The extent of the savings depends strongly on the behaviour of the residents, and can thus vary significantly from one housing associa-

tion to another. The main savings will come from reduced consumption of energy and water. Major savings in heating costs can be difficult to achieve as the temperature control has vastly improved with the new district heating sub-stations and the temperatures in the flats are often already fairly low. Also, as a result of individual apartment water metering, the water consumption has fallen significantly in the last few years, currently the levels are usually lower than e.g. in Finland.

A major long term benefit from any renovation project is the longer lifetime of the building. Another important factor is the increase in living comfort and habitability of the flats. It is not entirely easy to estimate the monetary value of these, although it is clear the benefits outweigh the expenses.

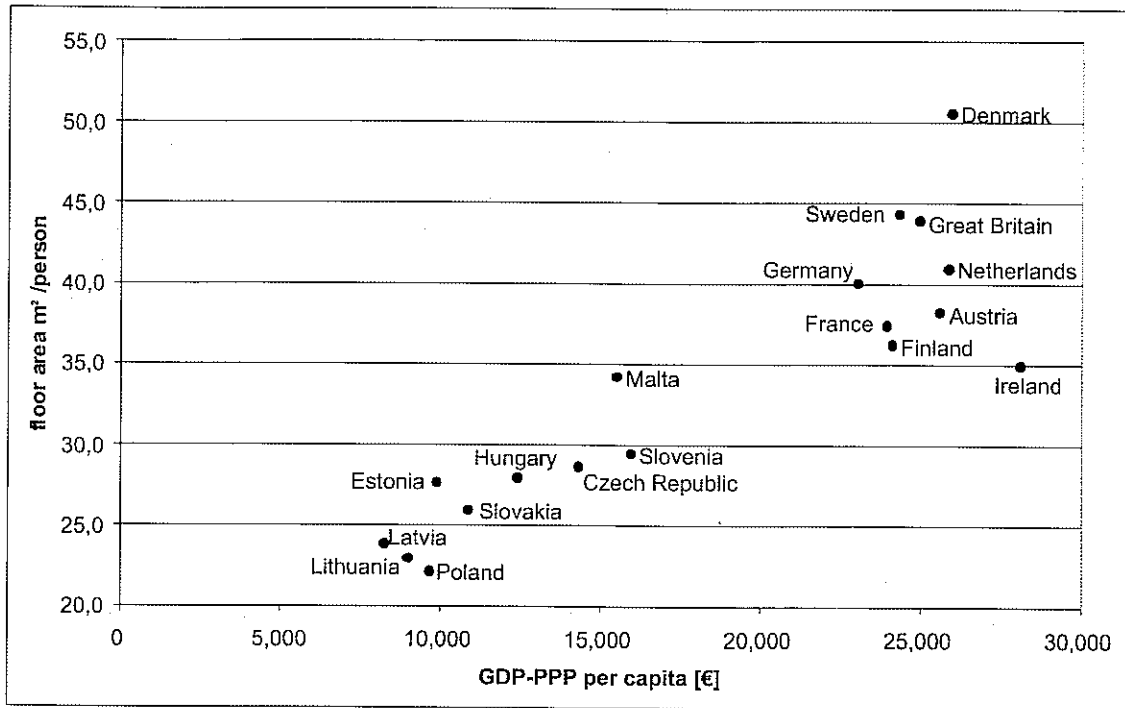
5. Impact of renovation on Estonian economy

During the first few years of the new Estonian independence the construction of new residential buildings was practically nonexistent. Repair or renovation of the existing building stock was not very active, either [1]. The question asked was, had Estonia been left with too large stock of deteriorating buildings that it could not afford to maintain.

The table below lists the average floor area per inhabitant in some European countries. It shows that the figure for Estonia is quite low in comparison with European average. [11,14]

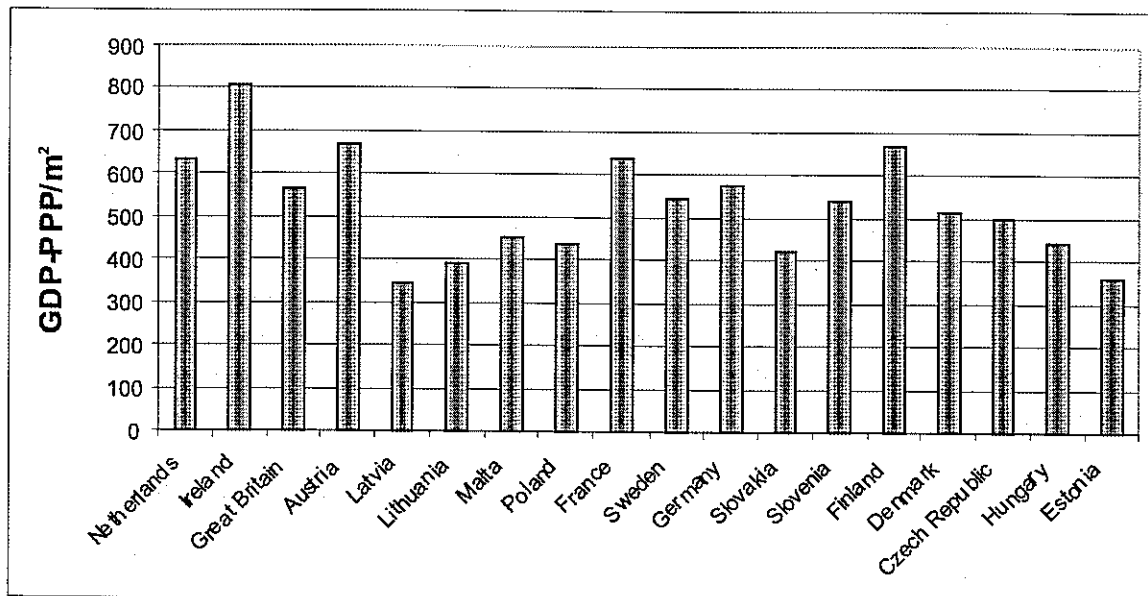
	Average floor area, m ² /inhabitant	Date of information
Denmark	50,6	2003
Sweden	44,4	2003
Germany	40,1	2002
Austria	38,3	2003
France	37,5	2002
Finland	36,3	2002
Ireland	35,0	2002
Czech Republic	28,7	2001
Hungary	28,0	2001
Estonia	27,7	2003
Latvia	23,9	2003
Lithuania	23,0	2003
Poland	22,2	2002

The graph below shows the GDP-PPP versus floor area in some European countries (both per capita). The graph shows that typically, with few exceptions, the higher the GDP per capita the higher the floor area. [10,11,14]



note. The Great Britain m² /person figure is for England only.

In the graph below the GDP-PPP has been divided by the average floor area. The figures would suggest that in Estonia the economic burden of repairing and renovating the building stock would be much heavier than in most other European countries.



One would also need to know the general state of the building stock in each country, i.e. how extensive renovation is required and how quickly. It is safe to say that in Estonia the situation is worse than in northern and western European countries, thus making the burden on the national economy even heavier. Typically in Estonia the buildings from 1980's can often, in some respects, be in more urgent need of repair than those built a decade or two earlier. The expectations regarding the standard of housing vary between countries. What in one country is considered just average standard can in another be considered high. At least at the moment this helps to lighten the renovation task in Estonia, although the situation can be expected to change in the coming years as the new homes are fitted to higher standards. However, at the moment the focus should be in preventing the deterioration of the building stock, especially the soviet era concrete block of flats, and perhaps later measures mainly improving the living comfort can be included as well. If the renovation measures are chosen carefully good results can be achieved even with low financial resources.

6. Future

The prices of new flats in Tallinn are currently very high, and still rising. One in a thoroughly renovated older block of flats is considerably cheaper, and the condition can be almost as good. Obviously a new one will have certain benefits, such as lifts and mechanical air-conditioning, that the older ones seldom have.

In 2004, the average yearly amount spent on housing was 6,000 EEK per year per person in Tallinn and around 5,200 EEK in the rest of the country. A family with three members would thus spend around 20,000 EEK on housing. If they were living in a 56 m² flat, they would spend around 12,000 EEK a year on heating, service charges etc. An additional 4,000-6,000 EEK a year would be spent on water charges and electricity.

The calculations earlier show that, with a 3% interest rate, the loan payments for the comprehensive renovation package would be around 355 EEK/m² /a (annuity option). For a family with three members living in a 56 m² flat this would add up to around 19,800 EEK/a, which would roughly double the amount spent on housing. For the basic package the situation looks more manageable, the additional cost would be ~6,300 EEK/a. With a 5% interest rate the figures would be 21,700 EEK and 7,000 EEK, respectively. These rough calculations suggest that especially with the current low interest rates a family with average income could normally afford the cost of the basic renovation package. The cost of the comprehensive package, on the other hand, would be unbearable for most.

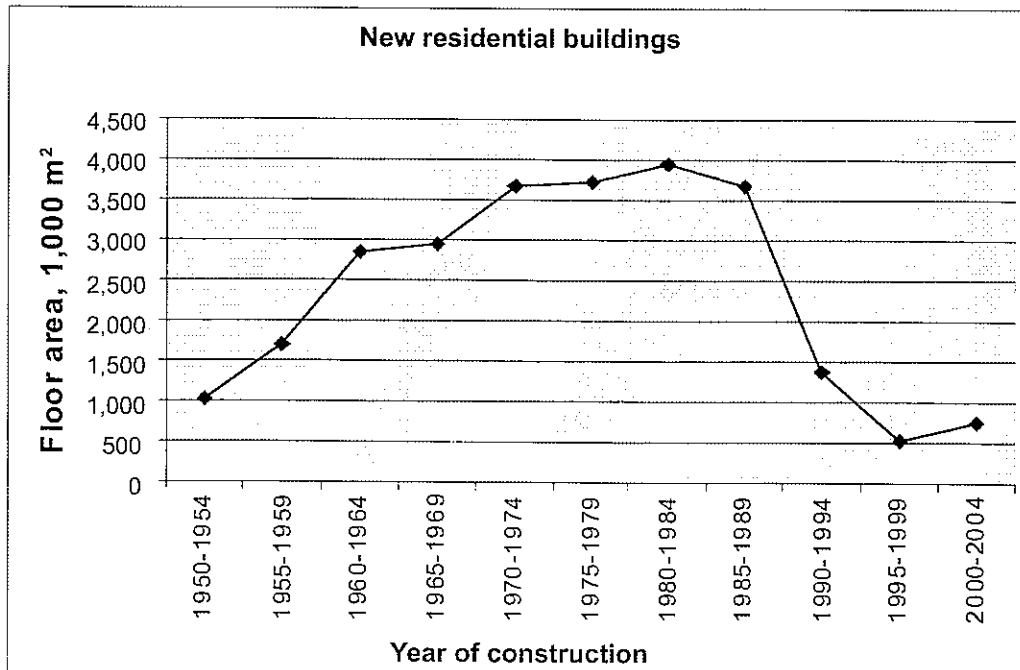
The speculation above regarding the comprehensive package is only theoretical. As mentioned earlier, the maximum amount of loan available is usually 1,000 EEK/m², which for our exemplar building would mean 3,2 million EEK. Thus, considerable savings would be needed to cover the rest of the costs. As a consequence, the more expensive renovation measures are usually carried out over a longer period, e.g. over

10 years. The table below shows the cost of some individual measures. Based on these, one can speculate on the various combinations for example 1,000 EEK/m² would cover. Naturally, over longer periods, inflation has to be taken into account as well.

	Cost EEK/m ²
New shut-off and control valves in the basement	15
New piping and valves in the basement	40
New radiators, thermostatic valves and replacing one-pipe system with a two-pipe system	155
New taps, showers and toilet seats	345
Roof (inclination, bitumen polymer sheeting)	90
Additional insulation of the gables	230
New windows	460
New balcony doors	155
New entrance doors	40
Additional insulation of the long walls (front and back)	885*
Insulation of the floor on the ground floor (basement ceiling)	10

*) Cost depends very much on applied measures. It is expected that all the surfaces to outdoor are insulated and that the new cover is better than average. Insulation is 100mm.

Between 1960's and 1980's a considerable number of new concrete element block of flats were built in Estonia. It has been estimated that there are around 1,500 such buildings, typically 5 or 9 storeys high [2,17]. The graph below shows the construction (by floor area) of new residential buildings in Estonia since 1950, in 5-year periods (i.e. the figures are totals over 5 years). The dramatic decline in construction since early 90's can be clearly seen. The statistics are not very liable, though, as it has been estimated that for 30% of the buildings in Tallinn the year of construction is not known. [1,3]



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If the average size of the 1,500 buildings was 4,500 m² , the total floor area would be close to 7 million m² . Adding other concrete element buildings, the total will rise to around 8 million m² . Based on the costs for the two renovation packages, renovating the whole building stock of residential concrete element block of flats would cost around 8 and 24 billion EEK for the basic and comprehensive package, respectively. The Estonian GDP in 2004 was 139 billion EEK. In 2003, around 1 billion EEK was spent on repair and renovation, of the 2.5 billion spent on construction in total [1]. This will have to increase considerably in the next 5-10 years if the soviet era blocks of flats were to be kept in reasonable condition.

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APPENDICES

- Appendix 1 A typical soviet era concrete block of flats
- Appendix 2 Average monthly salary for some professions
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APPENDIX 1

A typical soviet era concrete block of flats.

5-storey
4 staircases

A total of 60 flats, of which

- 10 x studio (separate kitchen)	34 m ²
- 10 x 1 bed. (plus kitchen and living room)	49 m ²
- 30 x 1 bed. (plus kitchen and living room)	56 m ²
- 10 x 2 bed. (plus kitchen and living room)	69 m ²
	total of 3,200 m ²

Width of the building	61 m
Depth	13 m
Height	16 m
Volume	12,750 m ³ (incl. basement)
	11,200 m ³ (excl. basement)

Number of windows	216
Number of balconies	80
Number of front doors	8

Connected to district heating network

APPENDIX 2

Average monthly salary for some professions.

The table below shows some examples of average monthly salaries in Estonia. The net salaries for 2004 were not yet available at the time of writing. (Estonia Statistical Database; employees with an employment contract, a service contract and working under the Public Service Act are included.)

2000	average gross salary EEK / month	average net salary EEK / month
Agriculture, hunting and related service activities	2,788	2,269
Forestry, logging and related service activities	4,329	3,413
Fishing	3,578	2,839
Mining and quarrying	5,889	4,601
Manufacturing	4,769	3,739
Electricity, gas and water supply	5,920	4,562
Construction	4,354	3,418
Wholesale and retail trade; repair of motor vehicles etc.	4,662	3,655
Hotels and restaurants	2,990	2,419
Transport, storage and communication	5,991	4,663
Financial intermediation	11,002	8,335
Real estate, renting and business activities	5,003	3,897
Public administration and defence; compulsory social security	6,284	4,940
Education	4,200	3,304
Health and social work	4,383	3,442
Other community, social and personal service activities	4,099	3,243
2001		
Agriculture, hunting and related service activities	3,241	2,646
Forestry, logging and related service activities	4,915	3,882
Fishing	3,779	3,018
Mining and quarrying	6,859	5,389
Manufacturing	5,157	4,068
Electricity, gas and water supply	6,738	5,205
Construction	5,161	4,079
Wholesale and retail trade; repair of motor vehicles etc.	5,416	4,256
Hotels and restaurants	3,611	2,923
Transport, storage and communication	6,472	5,039
Financial intermediation	12,258	9,347
Real estate, renting and business activities	6,407	4,993
Public administration and defence; compulsory social security	6,956	5,409
Education	4,769	3,776
Health and social work	4,781	3,784
Other community, social and personal service activities	4,697	3,728

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2002		
Agriculture, hunting and related service activities	3,846	3,068
Forestry, logging and related service activities	5,163	4,032
Fishing	4,638	3,640
Mining and quarrying	7,457	5,753
Manufacturing	5,628	4,390
Electricity, gas and water supply	7,306	5,617
Construction	5,793	4,501
Wholesale and retail trade; repair of motor vehicles etc.	5,884	4,571
Hotels and restaurants	3,416	2,753
Transport, storage and communication	7,062	5,475
Financial intermediation	13,296	10,001
Real estate, renting and business activities	8,203	6,250
Public administration and defence; compulsory social security	7,809	6,017
Education	5,382	4,208
Health and social work	4,977	3,912
Other community, social and personal service activities	4,977	3,923
2003		
Agriculture, hunting and related service activities	4,225	3,345
Forestry, logging and related service activities	5,836	4,545
Fishing	4,510	3,549
Mining and quarrying	8,131	6,191
Manufacturing	6,168	4,774
Electricity, gas and water supply	7,984	6,108
Construction	6,576	5,054
Wholesale and retail trade; repair of motor vehicles etc.	6,758	5,211
Hotels and restaurants	4,131	3,258
Transport, storage and communication	7,354	5,638
Financial intermediation	14,652	11,003
Real estate, renting and business activities	8,127	6,178
Public administration and defence; compulsory social security	8,522	6,504
Education	5,851	4,543
Health and social work	5,725	4,441
Other community, social and personal service activities	5,417	4,230
2004		
Agriculture, hunting and related service activities	4,766	n/a
Forestry, logging and related service activities	7,111	n/a
Fishing	4,417	n/a
Mining and quarrying	8,703	n/a
Manufacturing	6,650	n/a
Electricity, gas and water supply	8,463	n/a
Construction	7,307	n/a
Wholesale and retail trade; repair of motor vehicles etc.	6,928	n/a
Hotels and restaurants	4,380	n/a
Transport, storage and communication	7,973	n/a
Financial intermediation	14,913	n/a
Real estate, renting and business activities	9,217	n/a
Public administration and defence; compulsory social security	9,220	n/a
Education	6,466	n/a
Health and social work	6,525	n/a
Other community, social and personal service activities	6,197	n/a

n/a not available

APPENDIX 3

Comparison of different loan payment methods.

