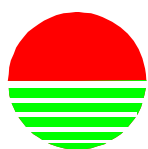


## WP 4 Energy Supply

# The Concept of Energy Efficient Refurbishment of Residential Buildings located in the area A1MWU

limited by streets Kusocińskiego, Wojska  
Polskiego, Fabryczna and Puławska in Piaseczno

15th January 2010



NATIONAL ENERGY CONSERVATION AGENCY



PIASECZNO MUNICIPALITY



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## Formal basis

The concept was elaborated in the framework of an agreement from 15 September 2009 between Piaseczno Municipality and NAPE, concerning preparation of “The Concept of Energy Efficient Refurbishment of Buildings located in the area A1MWU limited by streets Kusocińskiego, Wojska Polskiego, Fabryczna and Puławska in Piaseczno” for the purpose of realization of Urb.Energy project which is partly financed by the European Union through „Baltic Sea Region Programme 2007-2013 (CCI No. 2007CB163PO020)”.

## Aim

The aim of this study is to present a concept of thermomodernization of multifamily dwellings located in a typical residential district in the center of Piaseczno, taking into consideration possibilities of financing it by building owners and from other sources, including EU Structural Funds.

## Scope

This plan concerns 26 multifamily dwellings, for which energy audits have been elaborated in accordance with the Act on supporting thermomodernization and renovation of 21 November 2008, Journal of Laws No. 223, article 1459.

The energy audits are a source of information about the technical condition of these buildings affecting heat losses, and identify energy efficiency undertakings.

Moreover, energy audits are required to apply for financing from the system of financial support for thermomodernization undertakings, existing in Poland since 1998.

This study provides input to “The Concept of Integrated Urban Development of the area A1MWU limited by streets Kusocińskiego, Wojska Polskiego, Fabryczna and Puławska in Piaseczno,” prepared in the framework of the same agreement. The agreement is an indispensable document for property owners, to be able to apply for financing from EU Structural Funds dedicated to support urban development.

The study includes:

1. description of the existing situation, including technical, economic and ownership aspects of the buildings in question
2. technical-economic comparative analysis of thermomodernization undertakings identified in energy audits
3. a plan for energy efficient modernization of buildings, with consideration to available financing sources.

## Description of the existing situation, including technical, economic and ownership aspects of the buildings in question

There are 26 residential buildings in this area, 24 of which have been erected in years 1961-1966, and 2 in 1974. These are 3-5 storey buildings with total useful area of about 40 000 m<sup>2</sup>, total number of apartments is 1051, inhabited by some 2000 people. The average area of an apartment is 38 m<sup>2</sup> averagely inhabited by 2 persons.

All the buildings are constructed from prefabricated concrete blocks and are characterized by high values of the heat transfer coefficient, which leads to energy demand for heating on the level of approximately 240 kWh/m<sup>2</sup>/year, characteristic of buildings erected in that period. At present, the guidelines being in force for residential buildings design result in values of 100-120 kWh/m<sup>2</sup>/year.

In 4 of 18 buildings belonging to housing communities (Szkolna 8, 10, Wojska Polskiego 7, Kusocińskiego 3a), there have been comprehensive thermomodernization works conducted in the last 3 years, including thermal insulation of walls, flat roofs, windows replacement in staircases and in non-heated basements, doors and central heating system replacement. In these buildings, energy demand for heating purposes is approximately 100 kWh/m<sup>2</sup>/year. Investments in these buildings have been financed by housing communities from their own means accumulated in renovation funds, thermomodernization loans, and a small subsidy from EU funds in the framework of Interreg IIIB, BEEN project.

In 8 buildings belonging to the housing cooperative „Jedność” the energy demand for heating is 100-140 kWh/m<sup>2</sup>/year, because their thermal insulation has been partly improved and the central heating system has been replaced. Nevertheless, they require further actions to improve their energy performance.

The buildings are supplied with heat from the city grid operated by PCU Sp. z o.o., a company owned partly by the city and partly a cooperative property, operating a low-temperature boiler room powered by natural gas. District heating grids belong to Piaseczno Municipality. Domestic hot water is prepared in each apartment with the use of domestic gas boilers.

Of the 26 buildings, 8 belong to the housing cooperative „Jedność,” while the remaining 18 are parts of a housing estate belonging to housing communities, created on the basis of the Apartment ownership act of 24 June 1994 (Journal of Laws No. 85, article 388) from buildings belonging previously to the Piaseczno Municipality. The buildings are located on parcels limited by external outlines of buildings, while the surrounding green areas and small infrastructure belong to the Municipality of Piaseczno. Properties belonging to housing communities are managed by two licensed property managers.

## Technical-economic comparative analysis of thermomodernization undertakings identified in energy audits

The aim of an energy audit is to find an optimal, from the technical and economical point of view, scope of undertakings that will decrease energy demand for heating and domestic

hot water preparation. Energy audits are elaborated in accordance with national regulations being in force. Methodology of audit preparation includes:

1. choice of optimal thermal insulation thickness of external partitions
2. choice of optimal values of the heat transfer coefficient for windows and doors to be replaced
3. optimal scope of central heating modernization
4. optimal method of domestic hot water preparation in apartments
5. calculation of energy, economic, and ecological results of the optimal variant of thermomodernization investment.

The optimal variant of thermomodernization is individualized for each of the buildings in question, and depends on evaluation of the existing condition of external walls, central heating and domestic hot water systems. The scope of optimal variants of thermomodernization with their costs and results are presented in a summary table based on separate energy audits for each building in question. In all buildings gas boilers are to be replaced with central domestic hot water system through development of district heating nodes, which is conditioned by providing hot water supply in the summer by PCU, which is a subject of a separate investment program. In one of the buildings (Housing Community Szkolna 10) additionally, there are solar collectors planned to support the district heating node in domestic hot water preparation.

The calculated savings from realization of the planned thermomodernization undertakings are averagely 35,1% for all buildings, from 17,4% (Housing Community Szkolna 10) to 51,3% (Housing Community Szkolna 7).

Altogether, with the investment of 12,5 million PLN the inhabitants of all buildings will save about 0,63 million PLN annually. The average payback period for the whole area is approximately 20 years.

## A plan for energy efficient modernization of buildings, with consideration to available financing sources

### Own resources

The basic source of financing for thermomodernization of individual buildings are owners' own resources accumulated on renovation funds. Due to high costs of thermomodernization, the period of accumulating resources for this purpose would have to be long. Especially since the inhabitants of this area are not wealthy. The average advance payment towards the renovation fund for buildings in question is about 2 PLN/m<sup>2</sup> of usable floor area per month, that is 24 PLN/m<sup>2</sup> annually. Whereas the average unit cost of the planned thermomodernization is 314 PLN/m<sup>2</sup> of usable floor area. With this rate of advance payments towards the renovation fund, the average period of accumulating resources for thermomodernization by building owners would last 13 years.

### Loan with thermomodernization bonus

Owners of residential buildings in Poland are more and more willing to take advantage of the scheme of support for thermomodernization undertakings, which has been functioning since 1998. The bonus cannot exceed 20% of the capital of extended loan and cannot be

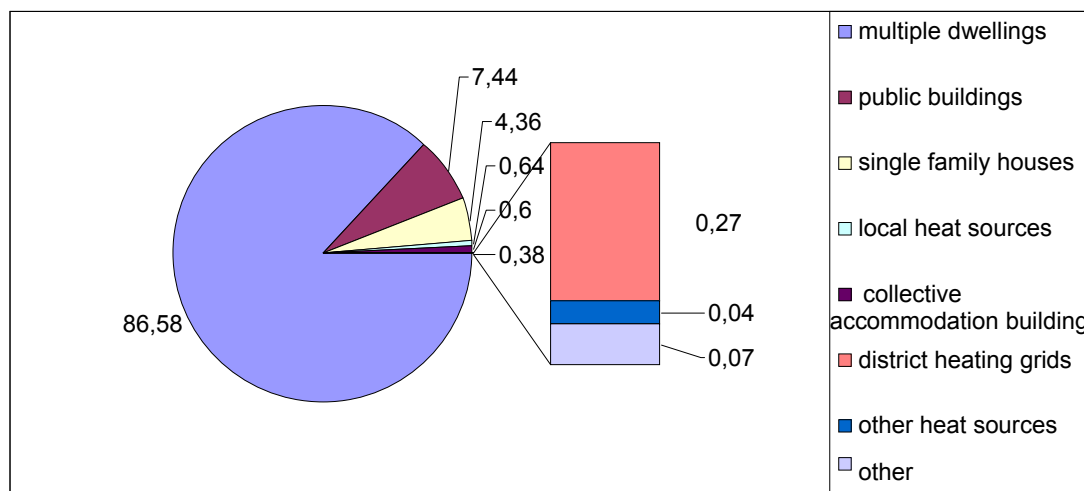
higher than 16% of the expenses for the realization of the thermomodernization undertaking and cannot exceed the duplication of the yearly heat cost savings calculated in the energy audit.

The objective was to provide support for thermomodernization undertakings in 30-50% of residential buildings requiring a significant improvement of energy efficiency. According to data of the Central Statistical Office from the year 2002, more than 85% of residential buildings were commissioned before the year 1987, in the period when regulations concerning thermal insulation of buildings were quite lenient. In some of these buildings there were window replacements or central heating system modernizations but in most of them there were no comprehensive thermomodernization undertakings or general renovations, which are needed more and more as the time goes by. The state budget supports the Thermomodernization Fund managed by Bank Gospodarstwa Krajowego with amounts of money that are greater each year, responding to the building owners' demands.

| Year         | Resources from state budget | Number of accepted applications | Awarded bonuses |               | Paid bonuses   |               | Free funds at the end of the period |
|--------------|-----------------------------|---------------------------------|-----------------|---------------|----------------|---------------|-------------------------------------|
|              | thousands PLN               |                                 | thousands PLN   | number        | thousands PLN  | number        |                                     |
| 1            | 2                           | 5                               | 6               | 7             | 8              | 9             | 10                                  |
| 1999         | 5 000                       | 144                             | 1 061           | 71            | 19             | 3             | 0                                   |
| 2000         | 12 000                      | 303                             | 3 859           | 235           | 482            | 38            | 0                                   |
| 2001         | 3 037                       | 191                             | 4 014           | 157           | 2 578          | 107           | 0                                   |
| 2002         | 36 750                      | 325                             | 13 042          | 286           | 8 230          | 244           | 0                                   |
| 2003         | 5 250                       | 890                             | 30 304          | 668           | 19 597         | 499           | 0                                   |
| 2004         | 41 580                      | 1 413                           | 58 554          | 1 152         | 43 084         | 968           | 0                                   |
| 2005         | 114 870                     | 1 871                           | 115 737         | 1 947         | 77 863         | 1 536         | 0                                   |
| 2006         | 124 900                     | 3 214                           | 110 033         | 1 812         | 106 479        | 1 781         | 0                                   |
| 2007         | 298 000                     | 3 314                           | 247 860         | 4 201         | 116 669        | 2 021         | 60 200                              |
| 2008         | 270 000                     | 2 859                           | 170 062         | 2 759         | 187 396        | 3 213         | 194 200                             |
| 2009*        | 109 300                     | 2 971                           | 178 704         | 2 914         | 139 303        | 2 392         | 151 192                             |
| <b>Total</b> | <b>1 020 687</b>            | <b>17 495</b>                   | <b>933 230</b>  | <b>16 202</b> | <b>701 700</b> | <b>12 802</b> |                                     |

\* until 31 October 2009

Owners of residential buildings and owners of public buildings belonging to local government units can benefit from this system. However, most clients are multiple dwelling owners represented by housing communities and housing cooperatives in an equal share. The structure of system users is shown on the chart below.



This instrument has been used by 4 housing communities from the area we are dealing with, and next 3 (Housing Communities Szkolna 3, Szkolna 5 and Puławska 19,21) are presently engaged in the process of acquiring a loan with thermomodernization bonus. However, they are not undertaking realization of the objective identified in the framework of Urb.Energy project of providing central hot water supply for the buildings, due to the lack of hot water supply from PCU caused by necessary investments in heat sources to enable hot water supply in summer.

## EU Sources

As a result of new EU Member States' activities and the support of some Western governments (Germany), new opportunities have appeared to increase utilization of resources for modernization of the housing sector. These financing opportunities are subject to the Council Regulation (EC) No 1083/2006 of 11 July 2006 laying down general provisions on the European Regional Development Fund, the European Social Fund and the Cohesion Fund:

point 13 of the preamble: *In view of the importance of sustainable urban development and the contribution of towns and cities, particularly medium-sized ones, to regional development, greater account should be taken of them by developing their role in programming to promote urban regeneration.*

- Article 27.4 b - National Strategy should include thematic and territorial priorities; *(w)here appropriate these priorities shall include actions relating to sustainable urban development, the lack of provisions concerning support for urban development requires justification before the EC;*
- Article 37.4 a - *Operational programmes financed by the ERDF shall contain information on the approach to the sustainable urban development where appropriate;*
- Article 37.6 a - *Operational programmes may also contain the list of cities chosen for addressing urban issues and the procedures for sub-delegation to urban authorities, possibly by means of a global grant;*

- Article 11.1 a - organizing partnerships with authorities and bodies such as the competent regional, local, urban and other public authorities;
- Article 44 - providing new financial instruments that will be applicable for urban development projects' realization (JEREMIE, JESSICA, JASPERS).

Obtaining EU support for thermomodernization of residential buildings is possible only in case of multifamily dwellings located in areas requiring special support, expressly delineated on the basis of Local Revitalization Programmes. The amount of means allocated for this purpose in Regional Operational Programmes cannot exceed 3% of their budgets. The areas of support for housing sector improvement are selected on the basis of the following criteria:

1. high level of poverty and exclusion
2. high level of long-term unemployment
3. precarious demographic trends
4. a low level of education, significant skills deficiencies and high dropout rates from school
5. high level of criminality and delinquency
6. particularly rundown environment
7. low level of economic activity
8. high number of immigrants, ethnic and minority groups, or refugees
9. comparatively low level of housing value
10. low level of energy performance in buildings.

The area, where housing can be a beneficiary, shall comply with at least three of the above mentioned criteria, two of which must fall within those listed under points 1- 9. The subjective scope of support is limited to common parts of multiple family dwellings, owned by municipalities, housing cooperatives, housing communities, social housing societies and private persons.

The integrated urban development concept for the given area, elaborated separately, shows that this area can be qualified as requiring special support, in the context of acquiring financing from the EU.

Improvements in multifamily dwellings that can be partly financed from ERDF have been listed in a detailed catalogue that includes:

- refurbishment of the following main structural parts of the building: roof, façade, windows and doors on the façade, staircase, inside and outside corridors, entrances and their exteriors, elevator
- replacement/renovation of all technical installations of the building
- energy-efficiency improvement (thermomodernization).

Support for the above mentioned undertakings can be in the form of a subsidy, i.e. refund of costs up to the limit set for the specific category of beneficiaries by the Regional Operational Programme. In Mazowieckie Voivodship in 2009 there was a closed competition with preselection for projects connected with Activity 5.2 „Cities' revitalization.” There were 77 applications submitted for the contest, of total value 647363828,88 PLN, which was 5 times more than the available means (about 33 million euro). Among 17 projects on top of the ranking list that exhausted available means, most were concerned with revitalization of old city centers. The only project concerned with improvement of the living conditions of the inhabitants of a housing estate - RSM Praga in Warsaw was ranked 31<sup>st</sup> with 82,2% of the maximal score. The next competition is planned for autumn of 2010 with 30 million PLN allocation for those subject to public aid.



## Other forms of financing

There is a possibility to apply the above mentioned new instrument of financing, or rather co-financing of living conditions sector modernization, called JESSICA. The general idea of the JESSICA instrument promoted by the European Investment Bank is the possibility of using available subsidies according to the above mentioned criteria for refunds of costs of individual projects and locating them in a fund (City Development Fund) that is a revolving fund.

The following diagram presents the flow of resources from the European Commission in the framework of JESSICA instrument:

- a given region in its Regional Operation Programme can specify that it wants to use subsidies both for individual projects and for the fund
- if this fund is established in a given region, it can be financed from the above mentioned subsidy and means from the national, local and international financial market
- the fund can offer financing for beneficiaries (according to the rules of providing financial aid) in the form of equity interests or preferential loans for realization of projects to make repayable investments in projects forming part of an integrated plan for sustainable urban development.



Figure 1.  
The flow of resources from the European Commission in the framework of JESSICA  
Source: European Investment Bank

Application of JESSICA instrument can bring the following benefits to the region:

- Renewable funds - financial resources from the fund that are paid back by beneficiaries can be used to finance subsequent projects, without having to return them to the European Union budget.

- Investment leverage - the potential to attract private sector investors to this fund is an important advantage of the JESSICA scheme. In this case the requirement concerning diverse financing sources when using Structural Funds would be met. More importantly, JESSICA funds are not treated as public debt despite the fact that subsidies are transformed into returnable investments.
- Flexibility - the rules of application of the instrument are more flexible, because they allow for broadening the list of qualified costs and make funds available in the form of equity interests, loans or guarantees.
- Disbursement period - application of JESSICA instrument means that Structural Funds do not have to be spent immediately, under the pressure from Member States. Disbursement schedule can be adjusted to project realization schedules and not limited by yearly budgeting of Structural Funds.
- Creativity - JESSICA can be applied in urban areas with weak structures and can be complementary to other initiatives and financing sources already existing in Member States. However, participation of the private sector is limited by the State Aid discipline.

Creating a JESSICA-type structure requires a decision on the level of the voivodship self-government, because initial funds must be acquired from the Regional Operation Programme. Until now, in Mazowieckie Voivodship no measures have been taken to create such a structure, although it is not out of the question. In case of creating such a structure, subjects located in the area discussed in this report will be entitled to use JESSICA, because the area will have an integrated urban development plan and building owners will have energy audits which are required to apply for preferential financing conditions. In the framework of JESSICA, owners of residential buildings will be able to take long-term preferential loans. Once created, JESSICA would become an alternative source of financing to the loan with thermomodernization bonus.

## Implementation plan for energy efficient modernization of buildings in the discussed area

Bearing in mind the scale of investments identified in energy audits, the ownership structure of the real estates, and wealth of the property owners the following action plan is proposed for the whole area:

### I. from the point of view of real estate owners (private owners of apartments, Piaseczno Municipality as a co-owner of some properties, housing communities, Housing Cooperative „Jedność”):

1. decision making by building owners concerning realization of thermomodernization undertakings identified in energy audits - the process has begun in 8 housing communities and in Housing Cooperative „Jedność,” its completion depends on individual decisions of building owners,
2. decision making by building owners concerning individual action plans and financing sources they want to use to finance thermomodernization - 8 housing communities

have decided to use their own resources and loans with thermomodernization bonus, completion time depends on individual building owners' decisions

**II. from the point of view of Piaseczno Municipality, as the coordinator of the process of elaboration of the integrated urban development concept for the area in the framework of Urb.Energy project:**

3. Continuation of actions realized in the framework of Urb.Energy project according to its schedule, that is:
  - a. until 30 June 2010 commission of the integrated Urban development plan for the area and presenting it to the subjects whom it applies, who will take further decisions
  - b. in III-IV quarter of 2010 choice of buildings for which the cost of preparing project documentation for thermomodernization will be subsidized and choice of contractor to prepare objective documentation
  - c. in I-II quarter of 2011 definition of the scope and objective of feasibility study for chosen micro projects identified in the area and choice of the contractor for this study
  - d. continuous actions promoting Urb.Energy project results among subjects concerned with the outcomes.

Table 1

| Lp.          | Address                          | Scope and cost of thermal refurbishment measures |                             |                                      |                                   |                               |  |   |   |                           |                   | Result         |              |             | CO2 reduction |             |
|--------------|----------------------------------|--|-----------------------------|--------------------------------------|-----------------------------------|-------------------------------|--|---|---|---------------------------|-------------------|----------------|--------------|-------------|---------------|-------------|
|              |                                  | Thermal insulation of walls                      | Thermal insulation of roofs | Replacement of windows in staircases | Replacement of windows in cellars | Replacement of entrance doors | Replacement of internal heating installation | Regulation of internal heating installation | Equipment with central domestic hot water | Thermal insulation design | Sum               | PLN/y          | GJ/y         | %           | Mg/y          | %           |
| 1.           | Piaseczno ul. Fabryczna 2        | 157 585  | -                           | -                                    | 2 025                             | -                             | 180 000                                      | -   | 110 000                                   | 6 000                     | 455 610           | 27 691         | 488          | 36,5        | 28,35         | 36,5        |
| 2.           | Piaseczno ul. Fabryczna 5        | 189 255  | 120 120                     | -                                    | 7 125                             | -                             | 220 000                                      | -   | 110 000                                   | 6 000                     | 652 500           | 41 890         | 714          | 49,1        | 41,48         | 49,1        |
| 3.           | Piaseczno ul. Fabryczna 7        | 189 255  | 117 390                     | -                                    | 7 125                             | -                             | 220 000                                      | -   | 110 000                                   | 6 000                     | 649 770           | 36 279         | 599          | 47,5        | 34,80         | 47,5        |
| 4.           | Piaseczno ul. Fabryczna 9        | 189 255  | -                           | -                                    | 7 125                             | -                             | 220 000                                      | -   | 110 000                                   | 6 000                     | 532 380           | 28 209         | 512          | 41,7        | 29,75         | 41,7        |
| 5.           | Piaseczno ul. Kusocińskiego 3a   | -  | -                           | -                                    | -                                 | -                             | -  | -   | 180 000                                   | -                         | 180 000           | 5 552          | 323          | 20,1        | 18,77         | 20,1        |
| 6.           | Piaseczno ul. Puławska 19        | 247 065  | 115 940                     | -                                    | 9 525                             | 11 340                        | 265 000                                      | -   | 140 000                                   | 6 000                     | 794 870           | 47 701         | 831          | 49,0        | 48,28         | 49,0        |
| 7.           | Piaseczno ul. Puławska 21        | 254 805  | -                           | -                                    | 9 525                             | -                             | 265 000                                      | -   | 165 000                                   | 6 000                     | 700 330           | 37 731         | 710          | 41,8        | 41,25         | 41,8        |
| 8.           | Piaseczno ul. Puławska 21A       | 149 730  | 49 940                      | -                                    | 3 750                             | -                             | 130 000                                      | -   | 90 000                                    | 6 000                     | 429 420           | 18 651         | 373          | 42,2        | 21,67         | 42,2        |
| 9.           | Piaseczno ul. Puławska 23        | 247 065  | -                           | -                                    | 9 525                             | -                             | 265 000                                      | -   | 140 000                                   | 6 000                     | 667 590           | 33 863         | 639          | 42,0        | 37,13         | 42,0        |
| 10.          | Piaseczno ul. Szkolna 3          | 144 530  | 80 960                      | -                                    | 5 025                             | 7 560                         | 145 000                                      | -   | 85 000                                    | 6 000                     | 474 075           | 29 716         | 496          | 51,1        | 28,82         | 51,1        |
| 11.          | Piaseczno ul. Szkolna 4          | 136 700  | -                           | -                                    | 3 750                             | 5 270                         | 130 000                                      | -   | 90 000                                    | 6 000                     | 371 720           | 20 999         | 395          | 44,7        | 22,95         | 44,7        |
| 12.          | Piaseczno ul. Szkolna 5          | 144 530  | 80 960                      | -                                    | 5 025                             | -                             | 145 000                                      | -   | 85 000                                    | 6 000                     | 466 515           | 29 798         | 506          | 50,8        | 29,40         | 50,8        |
| 13.          | Piaseczno ul. Szkolna 6          | 351 630  | 103 680                     | -                                    | 11 475                            | -                             | 380 000                                      | -   | 240 000                                   | 7 000                     | 1 093 785         | 78 965         | 1401         | 48,6        | 81,40         | 48,6        |
| 14.          | Piaseczno ul. Szkolna 7          | 144 530  | 80 960                      | -                                    | 5 025                             | 7 560                         | 145 000                                      | -   | 85 000                                    | 6 000                     | 474 075           | 29 535         | 499          | 51,3        | 28,99         | 51,3        |
| 15.          | Piaseczno ul. Szkolna 10A        | 149 730  | 49 940                      | -                                    | 3 750                             | -                             | 130 000                                      | -   | 90 000                                    | 6 000                     | 429 420           | 20 002         | 371          | 43,6        | 21,56         | 43,6        |
| 16.          | Piaseczno ul. Szkolna 8          | -  | -                           | -                                    | -                                 | -                             | -  | -   | 180 000                                   | -                         | 180 000           | 4 937          | 282          | 19,2        | 16,38         | 19,2        |
| 17.          | Piaseczno ul. Szkolna 10         | -  | -                           | -                                    | -                                 | -                             | -  | -   | 485 000                                   | -                         | 485 000           | 9 104          | 374          | 17,4        | 21,73         | 17,4        |
| 18.          | Piaseczno ul. Wojska Polskiego 7 | -  | -                           | -                                    | -                                 | -                             | -  | -   | 380 000                                   | -                         | 380 000           | 3 258          | 480          | 18,6        | 27,89         | 18,6        |
| 19.          | Piaseczno ul. Szkolna 12         | 190 470  | 50 600                      | 17 370                               | 3 225                             | -                             | -  | 14 000                                      | 90 000                                    | 6 000                     | 371 665           | 15 117         | 317          | 40,2        | 18,42         | 40,2        |
| 20.          | Piaseczno ul. Wojska Polskiego 5 | -  | 200 200                     | 72 000                               | 5 850                             | -                             | -  | 35 000                                      | 370 000                                   | -                         | 683 050           | 19 943         | 592          | 24,5        | 34,40         | 24,5        |
| 21.          | Piaseczno ul. Puławska 25        | -  | 121 880                     | -                                    | 9 525                             | -                             | -  | 20 000                                      | 140 000                                   | -                         | 291 405           | 13 407         | 318          | 28,0        | 18,48         | 28,0        |
| 22.          | Piaseczno ul. Kusocińskiego 5    | 137 550  | 49 940                      | -                                    | 3 750                             | 5 270                         | -  | 14 000                                      | 90 000                                    | 6 000                     | 306 510           | 11 282         | 228          | 34,5        | 13,25         | 34,5        |
| 23.          | Piaseczno ul. Kusocińskiego 3    | 190 470  | 50 600                      | 17 370                               | 3 225                             | 5 270                         | -  | 14 000                                      | 90 000                                    | 6 000                     | 376 935           | 15 245         | 319          | 39,4        | 18,53         | 39,4        |
| 24.          | Piaseczno ul. Szkolna 8a         | -  | 160 160                     | -                                    | 9 300                             | -                             | -  | 25 000                                      | 180 000                                   | -                         | 374 460           | 17 391         | 457          | 29,9        | 26,55         | 29,9        |
| 25.          | Piaseczno ul. Szkolna 1          | 30 870   | 49 860                      | -                                    | -                                 | 18 020                        | -  | 30 000                                      | 260 000                                   | -                         | 388 750           | 23 104         | 658          | 23,7        | 38,23         | 23,7        |
| 26.          | Piaseczno ul. Kusocińskiego 5a   | -  | 121 880                     | -                                    | 9 525                             | -                             | -  | 20 000                                      | 140 000                                   | -                         | 291 405           | 13 836         | 356          | 29,8        | 20,68         | 29,8        |
| <b>TOTAL</b> |                                  | <b>3 245 025</b>                                 | <b>1 605 010</b>            | <b>106 740</b>                       | <b>134 175</b>                    | <b>60 290</b>                 | <b>2 840 000</b>                             | <b>172 000</b>                              | <b>4 235 000</b>                          | <b>103 000</b>            | <b>12 501 240</b> | <b>633 206</b> | <b>13238</b> | <b>35,1</b> | <b>769,13</b> | <b>35,1</b> |
| %            |                                  | 26   | 13                          | 1                                    | 1                                 | 0                             | 23   | 1   | 34  | 1                         | 100               |                |              |             |               |             |



## Executive summary

The subject of this plan is thermomodernization of multifamily dwellings located at an old housing estate in Piaseczno. In parallel, an integrated urban development concept is being developed for the whole housing estate. The goal of this plan is to size up investments in reducing energy demand for the purpose of heating and domestic hot water preparation in 26 buildings erected between 1961 and 1974, whose total useful area is 40 000 m<sup>2</sup>, and which are inhabited by some 2000 people. Although the housing estate qualifies for financial support from the European Union, the owners of 8 buildings decided to use the Polish scheme of support for thermomodernization undertakings to finance a comprehensive thermomodernization including insulation of walls, flat roofs, replacing windows in staircases and in non-heated basements, replacing doors and the central heating system. The total cost of investments in thermomodernization, identified in energy audits for all 26 buildings is 12.5 mil. PLN. Inhabitants of all the buildings will save about 0.63 mil. PLN annually. The average payback period for the whole housing estate is approximately 20 years. Calculated savings from realization of the planned thermomodernisation undertakings are about 35,1% for all the buildings, maximally it will be 51,3%. Among the financing sources considered for thermomodernization of these buildings were: own sources, loan with thermomodernization bonus, and European Union sources. A rough realization schedule was also prepared.

## Imprint

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