*Energy Efficiency Improvements in Existing Buildings:*

# *PHARE Project "Demonstration Project for Energy Efficiency in Multi-dwelling Houses with Individual Heating"*

## *Sofia Energy centre, Bulgaria*

## Summary

The project was executed in a complex of 6 standard pre-fabricated panel type buildings in the town of Radomir, Bulgaria, and the implemented measures for improving energy performance of the building shell were: application of thermal insulation on the exterior walls, roofs and basement ceilings; replacement of wooden windows and doors with aluminium ones and repair of carpentry; thermal insulation and glazing of balconies; replacement of main entrances; restriction of air circulation in the joints.

| **End-user area** | | **Target Audience** | | **Technical** | |
|---|---|---|---|---|---|
| ☐ | New buildings | ☐ | Citizens | ■ | Energy efficiency |
| ■ | Refurbishment of buildings | ☐ | Households | ☐ | Heating |
| ☐ | Transport and mobility | ■ | Property owners | ☐ | Cooling |
| ☐ | Financial instruments | ☐ | Schools and universities | ☐ | Appliances |
| ☐ | Industry | ☐ | Decision makers | ☐ | Lighting |
| ☐ | Legal initiatives (municipal regulations, directives, etc) | ☐ | Local and regional authorities | ☐ | CHP |
| ☐ | Planning issues | ☐ | Transport companies | ☐ | District Heating |
| ☐ | Sustainable communities | ☐ | Utilities | ☐ | Solar energy |
| ☐ | User behaviour | ☐ | ESCOs | ☐ | Biomass |
| ☐ | Education | ☐ | Architects and engineers | ☐ | Wind |
| ☐ | Other | ☐ | Financial institutions | ☐ | Geothermal |
| | | ☐ | Other | ☐ | Hydro power |
| | | | | ☐ | Other |

## Context

Pre-fabricated panel type buildings in Bulgaria are about 20 % of the total building stock. Given the inherited poor thermal characteristics of these buildings the main aim of the project was to show the benefits of improving the building shell and the consequent energy and costs savings, and thus to contribute to increase of energy efficiency in the building sector of Bulgaria.

## Objectives

Energy efficiency improvements in existing pre-fabricated panel type buildings

## Process

- Exterior wall insulation has been implemented in three buildings using extruded polystyrene board produced by the Greek company FIBRAN. The insulation material features good thermal

insulation properties, low water absorption and high compressive strength. Insulation boards of 6 cm, 4 cm and 3 cm thickness have been applied for facade external walls, to balconies and staircases respectively. The insulation boards on external walls have been glued to the old plaster and nailed with plastic couplings, then a thin layer of plaster and a fibre-glass grid (for reinforcement of the plaster), external layer of plaster with special additives for elasticity and final finishing have been applied.

- Thermal insulation and water proofing of the roof;
- Thermal insulation of the basement ceiling
- Restriction of air circulation in the joints between buildings;
- Carpentry replacement (wooden windows and doors) with aluminum ones in one of the demo buildings;
- Repair of existing wooden carpentry in two of the buildings;
- Replacement of the main entrances
- Thermal insulation and glazing of balconies in one of the demo buildings (where carpentry replacements was executed)

## Financial resources and partners

The total project costs amounted to about 180 000 Euro and was 100 % funded by EU Phare Programme. The partners were EXERGIA S.A., Athens, Greece; Sofia Energy Centre, Bulgaria and the owners of the buildings in Radomir

## Results

As a result of the measures undertaken the thermal characteristics of the buildings have been significantly improved and the inhabitants have enjoyed increased thermal comfort in comparison with the non-insulated buildings.

## Lessons learned and repeatability

The implemented project has a huge replication potential given the large number of pre-fabricated panel buildings in Bulgaria and in the other CEE countries, featuring poor thermal characteristics at present.

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Equipment manufacturers: FIBRAN, Greece
Financial organisations: EC Phare Programme