

## Multi-Family Apartment Building Energy Retrofits in Valjevo

Supported by the United States Agency for International Development's (USAID) Serbia Better Energy project, implemented with E3 International's technical guidance, energy efficiency retrofits in three multi-family apartment buildings (MABs) in Valjevo were completed between December 2022 and April 2023. The 3 buildings selected



for the project are typical of apartment buildings in Valjevo, with individual units heated by electricity and wood stoves. Valjevo is one of the cities with the worst air pollution in Serbia, a major cause of which is individual wood stoves found in many apartments. Researchers have estimated that residential buildings in Serbia use two to four times the amount of energy as the average building in European Union countries, with significant energy losses through building exterior walls, as shown in the thermal image below. Although there has been some success in carrying out efficiency improvements in private households, public buildings, and industrial buildings, there has been less success in addressing multi-apartment buildings (MABs) due to a range of technical, legal and financial obstacles. The energy efficiency retrofits in each building implemented under Better Energy, included exterior façade insulation to demonstrate the impact on heating costs, air quality, and occupant comfort from well-designed and well-implemented MAB energy efficiency projects

### Project design

The Serbia Better Energy (BE) Activity is designed to address high inefficiency of the Serbian residential buildings sector. The Better Energy project team—using its proven MAB Investment Accelerator framework of best practices-- worked to perform baseline data collection,

conduct an energy audit, design and specify the efficiency measures, and manage the procurement and installation for each MAB, focusing on reducing thermal loss in the building and reducing the cost of heating for occupants. Project MABs and efficiency measures installed include:

MAB	Energy Efficiency Measure	Area of External Walls
Sretena Dudića 28L	10 cm thermal insulation - facade	643 m <sup>2</sup>
Vlade Danilovića 1	10 cm thermal insulation - facade	740 m <sup>2</sup>
Vladike Nikolaja 20	10 cm thermal insulation - facade	414 m <sup>2</sup>

### Cost Savings

Investment costs and savings are presented below. While only 1-3 months of project monitoring is available, results are quite impressive. Savings for individual apartments ranged from 10% to 60%.



Depending on the habits of occupants, overall building energy savings for each MAB for the short monitoring period were very high, ranging from 25% to 33%. The heating season 2023-2024 will provide additional data points for monitoring & verification, and we expect similar excellent savings.

MAB	Energy Savings for Individual Apartments	Building Energy Savings	Total Investment
Sretena Dudića 28L	34.1-59.9% (1)	31.9%	€ 21,565.10
Vlade Danilovića 1	10.4-52.9% (2)	24.9%	€ 25,652.47
Vladike Nikolaja 20	16.4-47.2% (3)	32.7%	€ 14,020.95

(1) Mar 2023  
 (2) Jan-Mar 2023  
 (3) Feb-Mar 2023

### Disclaimer

*This activity was largely implemented by E3 International under its engagement on the USAID Serbia **BETTER ENERGY PROJECT** in cooperation with Chemonics International.*