



## Closing the gap – the opportunity for sustainability and smart transition in the Central and East Europe countries

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### ABSTRACT

For almost half a century the countries of CEE were part of- or were remaining under the influence of- the Soviet Union what caused gaping difference in the starting line towards sustainability. Here the prefabricated concrete blocks of flats were being built at the scale unseen in the western countries. Those buildings, approximately a quarter of the residential market, are in a structurally sound condition to last another five or more decades. However, during their construction, the requirements for energy efficiency were almost nonexistent. Therefore, their refurbishment and thermal upgrades is a prerequisite, and due to sustainability, the demolition should not be considered unless it is unavoidable. This paper discusses the case of one mass housing block of flats and method to find the most efficient way to bring it to the higher energy efficiency standards using the BIM simulation technology. The chosen solution might be widely implemented due to typology. The effect of the scale (any refurbishment to one block can be performed to many others of the same type) gives the opportunity to substantially cut the energy consumption and close the huge gap between the east and west European blocks on our way to a greener future.

Video and Document to this article can be found online at <https://doi.org/10.1016/j.sctalk.2023.100269>.

### Figures and tables

### CRedit authorship contribution statement

**Paulina Duch-Żebrowska:** Methodology, Software, Investigation, Writing - Original draft. **Katarzyna Zielonko-Jung:** Conceptualization, Supervision, Writing- Reviewing and Editing.

### Data availability

Data will be made available on request.

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### Declaration of interests

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

### Further reading

- [1] Baer-Pásztozy, Bergmüller, Public participation in the EU – a comparison between East and West, Conference Proceedings Impact Assessment the Next Generation 33rd Annual Meeting of the International Association for Impact Assessment, 2013.
- [2] V. Beiser, *The World in a Grain: The Story of Sand and How It Transformed Civilization*, Riverhead Books, New York, 2019.
- [3] Bielobradek Andrzej, *Systemy budownictwa mieszkaniowego i ogólnego*, Arkady Warszawa, 1974 1974.
- [4] K. Dekker, R. Van Kempen, *Large housing estates in Europe: A contemporary overview*. 2004, Royal Dutch Geographical Society KNAG, 2005.
- [5] S. Durdyev, G. Dehdasht, S.R. Mohandes, D.J. Edwards, Review of the building information modelling (BIM) implementation in the context of building energy assessment, *Energies* 14 (24) (2021) 8487.
- [6] R. Galvin, M. Sunikka-Blank, *A Critical Appraisal of Germany's Thermal Retrofit Policy: Turning Down the Heat*, Springer-Verlag, Berlin/Heidelberg/New York, 2013 (ISBN-10: 1447153669, ISBN-13: 978-1447153665).
- [7] E. Lorenzo-Sáez, J.-V. Oliver-Villanueva, E. Coll-Aliaga, L.-G. Lemus-Zúñiga, V. Lema-Arce, A. Reig-Fabado, Energy efficiency and GHG emissions mapping of buildings for decision-making processes against climate change at the local level, *Sustainability* 12 (7) (2020) 2982, <https://doi.org/10.3390/su12072982>.

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- [8] S. Lössl, Stadtbau im Märkischen Viertel [Refurbishment at Berlin's Märkisches Viertel neighbourhood], retrieved from: [www.use.metropolis.org/case-studies/deutschlands-grosste-niedrigenergiesiedlung-das-markische-viertel](http://www.use.metropolis.org/case-studies/deutschlands-grosste-niedrigenergiesiedlung-das-markische-viertel) 2016.
- [9] W. Korzeniewski, Poradnik Projektanta Budownictwa Mieszkaniowego [Residential housing designer's guidebook], Arkady, Warszawa, 1981 ISBN: 9788321329130.
- [10] J. Novak, M. Purta, T. Marciniak, The rise of Digital Challengers - How digitization can become the next growth engine for Central and Eastern Europe, McKinsey & Company, 2018.
- [11] Ostanska Anna, Wpływ dotychczasowych termomodernizacji budynków mieszkalnych na oszczędność energii i planowanie programów rewitalizacji na przykładzie jednego z lubelskich osiedli, Budownictwo i Architektura 7 (2010) 89–103.
- [12] A.G. Ruggeri, L. Gabrielli, M. Scarpa, Energy Retrofit in European building portfolios: a review of five key aspects, Sustainability 12 (18) (2020) 7465, <https://doi.org/10.3390/su12187465>.
- [13] Statistical Review of World Energy, BP, June; London, UK, 2020.
- [14] Transformation of 530 dwellings - Grand Parc Bordeaux, retrieved from: [www.miesarch.com/work/3889](http://www.miesarch.com/work/3889) 2019.



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