



SERBIAN – GERMAN DEVELOPMENT COOPERATION PROJECTS ON ENERGY EFFICIENCY IN BUILDINGS

Implemented by Deutsche Gesellschaft für
Internationale Zusammenarbeit (GIZ) GmbH



EECG meeting, 6th June 2018



CHRONOLOGY OF SERBIAN-GERMAN COOPERATION IN THE FIELD OF EE

Residential buildings

Phase I: Advisory in Energy Efficiency (01/2008 – 12/2010)

Objective: The implementation of the energy-efficient measures within the private households has been improved.

Phase II: Advisory in Energy Efficiency (01/2011 – 03/2014)

Objective: The pre-conditions for implementation of the national program of Energy Efficiency in building sector are established.

Phase III: Advisory in Energy Efficiency (04/2014 – 03/2017)

Objective: Implementation of the national energy efficiency action plan (NEEAP) in the building sector is improved.

Partner(s): Ministry responsible for energy / construction

(Ministry of Mining and Energy and Ministry of Construction, Transport and Infrastructure)

Public buildings

DKTI- Energy Efficiency in Public Buildings (10/2015 – 12/2019)

Objective: Preconditions for the reduction of the emission of greenhouse gases through increased energy efficiency (EE) in public buildings are improved

Political partner: Ministry of Mining and Energy



AREAS OF INTERVENTION

Legislation framework

Tools and Instruments

Capacity development

Awareness raising





LEGISLATION FRAMEWORK

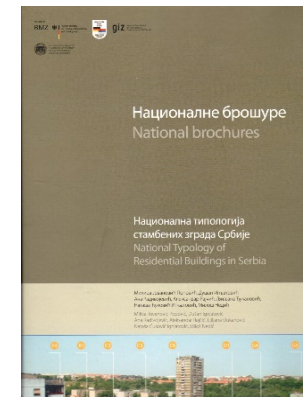
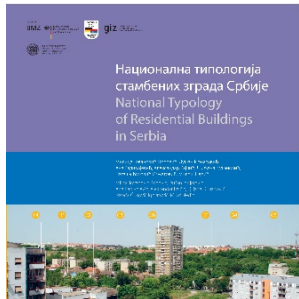
- Support in transposition of EU directives: EPBD and EED
- Introduction of system of building certification
- Support in drafting of legal / regulatory documents on EE in buildings
- Broad consultation processes (inter-sectoral WGs, Parliament, City Councils, etc.), CSOs and private sector
- Local energy efficiency action plans for residential buildings





BUILDING TYPOLOGIES AS INPUTS TO POLICY DEVELOPMENT AND EPBD IMPLEMENTATION

- National typology of residential buildings
(Belgrade Faculty of Architecture, 2013)



- National typology of residential buildings in Serbia constructed since 2013 (Belgrade Faculty of Architecture, 2017)
- National typology of schools (University of Belgrade, 2018)
- National typology of kindergartens (University of Belgrade, 2018)





NATIONAL TYPOLOGY OF RESIDENTIAL BUILDINGS (1)

PHASE 1

- **EU Project TABULA** Project co-funded by the Intelligent Energy Europe program of the EU (2009-2012)
- Typology Approach for Building Stock Energy Assessment.
- Serbia - associated partner

PHASE 2

- **EU Project EPISCOPE** (2013-2016)

<http://www.episcope.eu/building-typology/country/rs/>

Национална типологија стамбених зграда Србије

Serbian Residential Building Typology

Тип	породично становање (до 4 стана) family housing (up to 4 apartments)		вишепородично становање (више од 4 стана по улазу) multifamily housing (more than 4 apartments per entrance)			
	1 слободностојећа Freestanding	2 у низу In a row	3 слободностојећа Freestanding	4 ламена Lamella	5 у низу In a row	6 скајпеп High-rise
A < 1919.						
Б 1919-1945						
Ц 1946-1960						
Д 1961-1970						
Е 1971-1980						
Ф 1981-1990						
Г 1991-2011						
Х - Н ≥ 2013						



STEPS IN CREATION OF BUILDING TYPOLOGIES

- DATA COLLECTION: Survey of building stock
- DATA PROCESSING
 - Assessment of construction and energy data (representative sample)
 - 23,000 residential buildings
 - Approx. 2,000 schools
 - 563 kindergartens
 - Statistical analysis
 - Clustering
 - Definition of model building and real representative of model building
 - Calculations
 - A complete overview of energy needed for heating, lightening and HWP
 - Definition of improvement levels 1 and 2 (+3)
 - Assessment of potential savings of energy and CO2 emission reduction










LOCAL RESIDENTIAL BUILDING TYPOLOGIES IN SERBIA

- PILOT PROJECT - LEEAP: Vršac
- LEEAPS: Vrbas, Pirot, Ivanjica and Soko Banja


STEPS:

- Survey of residential building stock;
- Creation of local typology building matrix;
- Calculation of potential savings in residential building sector;
- Drafting of LEEAP;
- LEEAP adoption and implementation.

TYPE	Family housing		Multi family housing	
	1 detached	2 row house	3 detached	4 Apartment block
A Before 1945				
	8.85 % 3.67 % 6.30 % 3.62 %	6.10 % 4.57 %	0.12 % 0.55 % 0.06 % 0.31 %	0.04 % 0.19 %
B 1946-1960				
	10.05 % 4.21 % 6.61 % 3.85 %	4.34 % 1.95 %	0.25 % 1.32 % 0.02 % 0.04 %	0.01 % 0.06 %
C 1961-1970				
	13.08 % 5.15 % 9.08 % 5.31 %	1.09 % 0.43 % 6.34 % 3.35 %	0.73 % 5.99 % 0.20 % 1.61 %	0.06 % 1.18 % 0.06 % 0.49 %
D 1971-1980				
	19.48 % 11.96 % 13.80 % 10.57 %	1.42 % 0.89 % 6.73 % 5.76 %	2.01 % 16.30 % 0.30 % 4.23 %	0.11 % 2.59 % 0.09 % 1.09 %
E 1981-1990				
	19.55 % 10.96 % 17.50 % 21.07 %	1.58 % 0.99 % 6.66 % 8.12 %	1.39 % 11.80 % 0.07 % 0.72 %	0.05 % 1.35 % 0.05 % 0.34 %
F 1991-2011				
	17.36 % 10.69 % 12.74 % 17.07 %	1.68 % 1.32 % 2.61 % 3.16 %	1.11 % 8.08 % 0.24 % 1.93 %	0.03 % 0.60 % 0.06 % 0.58 %




SOFTWARE FOR EE ESTIMATION IN RESIDENTIAL BUILDINGS



НАЦИОНАЛНА
ТИПОЛОГИЈА
СТАМБЕНИХ ЗГРАДА СРБИЈЕ

СЛОБОДНОСТОЈЕЋИ ПОРОДИЧНИ ОБЈЕКАТ



Година изградње: 1971 - 1980
Површина грејана: 110.87 m²
Запремина грејана: 288.88 m³

E1 ИНТЕРВЕНЦИЈА НА НИВОУ ГРАЂЕВИНСКОГ ФОНДА

Број зграда	454893	20.220 %
Површина [m ²]	38021616	12.987 %
Енергија потребна за грејање [MWh/годишње]	12433068	19.033 %

Зграде на којима је мера примењена

количина проценат

ПРЕРАЧУНАЈ

Изабери други објекат

ПОСТОЈЕЋЕ СТАЊЕ

ПОЗИЦИЈА	ОПИС	ЈЕД. ЦЕНА	УКУПНО
<input checked="" type="checkbox"/> СПОЉНИ ЗИД	Fz1 Израда термоизолаване фасаде са дебелисплојним малтером (бушење и постављање анкера, лепљење термоизолационих плоча ЕПС, постављање и везивање арматурне мреже и поцинкованог рабипа) по м2. Термоизолациони слој у цм. 15 cm	17.39	2981.52
<input checked="" type="checkbox"/> ПРОЗОРИ И БАЛКОНСКА ВРАТА	Pt1 Набавка и монтажа једноструког прозора, конструкције рама и крила од алуминијумских профила са са унапређеним термопрекидом, застакљених термопакетом, по м2. (2.5m2/15m2 фасаде) двослојни стакло пакет, нискоемисиони премаз, испуна од племенитог гаса U=1.4W/m ² K	197.00	4373.4
	Pt1 Набавка и монтажа једноструког прозора, рам и крило од лепљеног ламелираног дрвета, застакљених термопакетом. Опшивка кровниог прозора са спољне стране (лимарски радови и изолација спојева типским елементима), по м2. (1.0m2/20m2 крова) двослојни стакло пакет, нискоемисиони премаз, испуна од племенитог гаса U=1.5W/m ² K	36.96	820.51

Улазни подаци

Цена kWh еуроценти:

Каматна стопа: %

Енергент:

Енергетски разред

G

Qh an=309.9kWh/m²

Смањење емисије (kg CO₂)

10.307,64

Уштеда (kWh/a)

34.358,82

98.02 %

Уштеда (€/a)

2.062,00

Инвестиција укупно (€)

8.175,00

Отплата (бр.година)

4,16

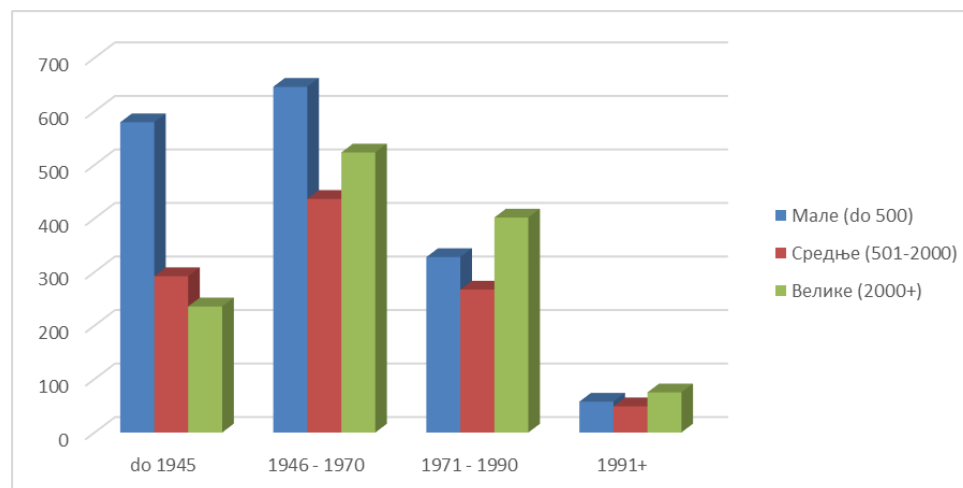
Назад

Сачувај



NATIONAL TYPOLOGY OF SCHOOLS

Distribution of building types:
according to the size and age class
(number of buildings)





NATIONAL TYPOLOGY OF SCHOOLS

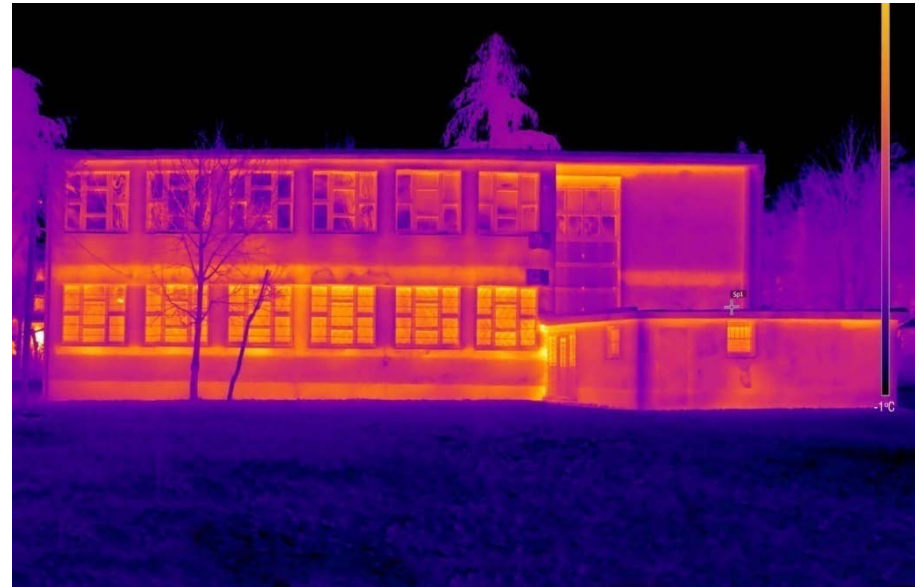
A great diversity in energy performance





NATIONAL TYPOLOGY OF SCHOOLS

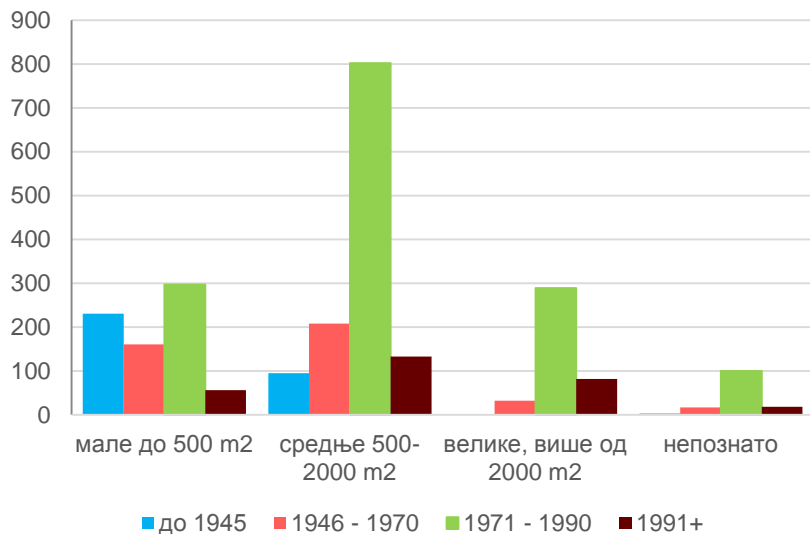
A great diversity in energy performance





NATIONAL TYPOLOGY OF KINDERGARTENS

Distribution of building types according to the size and age class (number of buildings)



	<500 m ²	500-2,000 m ²	>2,000 m ²
Until 1945			
1945-1970			
1971-1990			



BENEFITS

- an overview of existing building stock in Serbia (residential buildings, schools, kindergartens)
- A complete overview of energy needed for heating, lightening and HWP
- Assessment of potential of energy and CO2 saving
- Bases for assessment of macro-economic benefits of implementation of EE measures
- Key inputs for creation of national and local EE strategies and action plans
- Inputs for policy development and implementation



Thank you for your attention!

As a federally owned enterprise, GIZ supports the German Government in achieving its objectives in the field of international cooperation for sustainable development.

Published by

Deutsche Gesellschaft für
Internationale Zusammenarbeit (GIZ) GmbH
Energy Efficiency in Public Buildings in Serbia

23 Terazije St.
11000 Belgrade
Serbia

T/F +381 113690 650
E ee-project@giz.de
I www.giz.de

Author

Svetlana Djokic
GIZ Senior Project Manager

T +381 63 413 841
E svjetlana.djokic@giz.de