

Webinar 2nd Workshop Nearly Zero Energy Hospital Buildings

18 December 2020

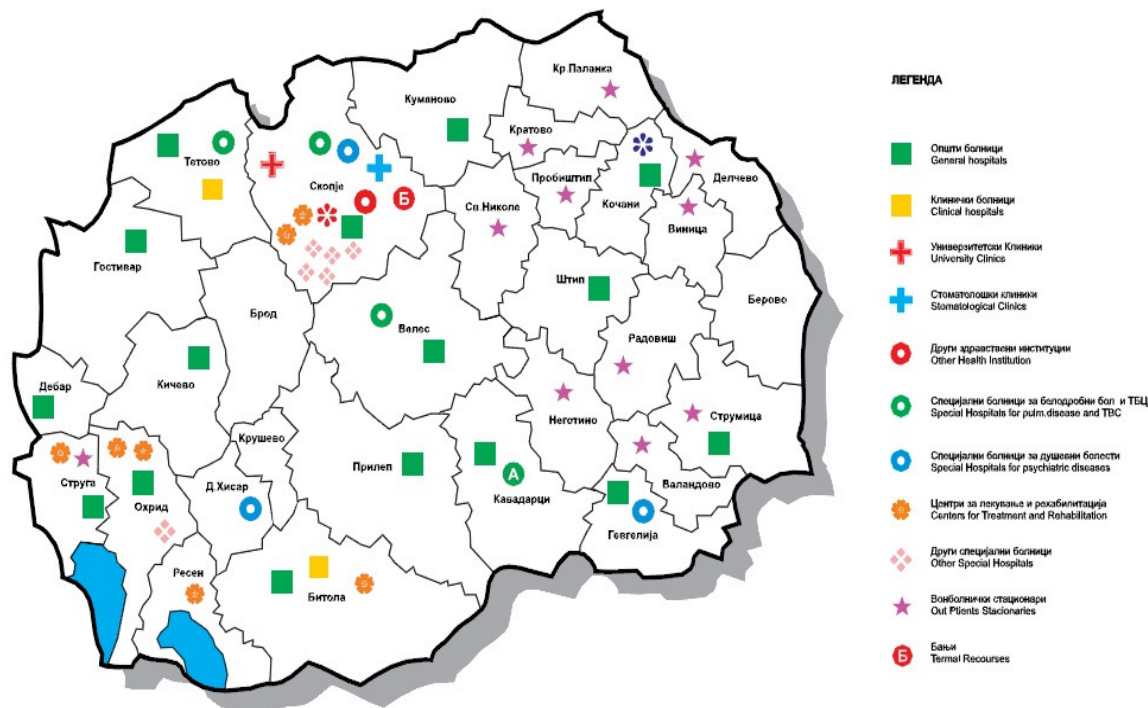
**Energy Performance of Hospitals in
Greece, Albania, Bulgaria, Cyprus and North Macedonia**

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Project co-funded by the European Union



General Information on Hospital Buildings



- **16** analysed hospitals are **public** and they were selected from every major town/city in the country (there is significant number of **public** and **private hospitals** in the capital **Skopje**)
- There are located in **3** dominant climate zones:
 - **8** in Hot Continental climate (HC),
 - **7** in Continental/Sub-Mediterranean climate (C-SM), and
 - **1** in Sub-Mediterranean climate (SM)
- The stock of analysed hospitals were mostly **over 50** years old.

Initial Remarks

Input data was obtained by **desk-based interviews** and **inquiries** and **2 site-visits** conducted in 2018 (pertains to 2017).

Input data was used at face value (not verified). 2 audits were carried out in 2018 and 2019.

Majority of buildings are old and:

- Built in 60s and before (8), 70s (3) and 80s (2)
- Most of them have **not** been **renovated**
- Most of them are **not insulated**
- Most of them have **single-glazing windows**

Energy systems

HEATING:

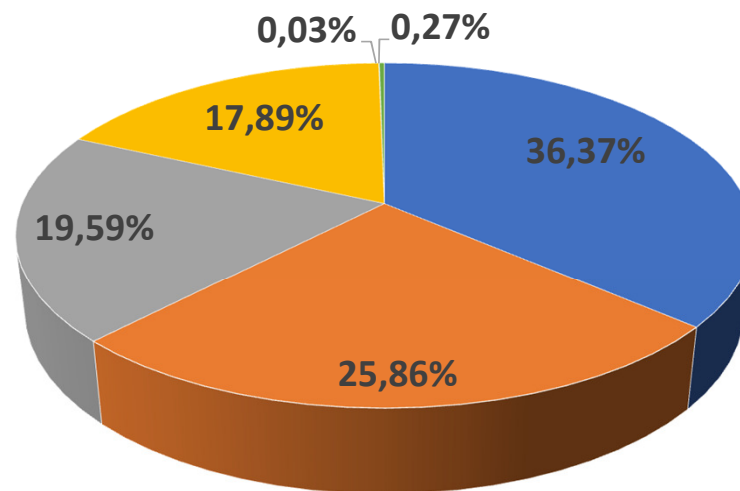
- light heating oil,
- heating heating oil,
- natural gas (LNG),
- liquified petroleum gas (LPG), and
- firewood

Cooling/Ventilation, Lighting, and other purposes:

- electricity

Energy data

Energy consumption by fuel



■ Electricity (kWh)

■ Heavy heating oil (tonnes)

■ Light heating oil (litres)

■ LPG (kg)

■ Natural Gas (Nm3)

■ Biomass (m3)

Energy data

Energy consumption - TPEC (kWh/m²/a)

| Клас | min, kWh/m ² | max, kWh/m ² | СГРАДИ ЗА ЗДРАВЕОПАЗВАНЕ |
|------|----------------------------|----------------------------|---|
| A+ | < | 70 |  |
| A | 70 | 140 |  |
| B | 141 | 280 |  |
| C | 281 | 365 |  |
| D | 366 | 450 |  |
| E | 451 | 563 |  |
| F | 564 | 675 |  |
| G | > | 675 |  |

Primary energy consumption scale for Hospitals in Bulgaria

| Ser. | Hospital Name | Town/ City | Climate type | Total primary energy consumption per m2 per annum - kWh/m ² /a | Energy Class Total |
|------|-----------------------------------|---------------|-----------------|---|--------------------------|
| 1 | JZU GOB „8-mi Septemvri“ - Skopje | SK | C-SM | 321,22 | C |
| 2 | JZU Opšta bolnica - Kičevo | KI | HC | 537,63 | E |
| 3 | JZU Opšta bolnica - Kumanovo | KU | C-SM | 651,96 | F |
| 4 | JZU Opšta bolnica - Ohrid | OH | HC | 364,66 | C |
| 5 | JZU Opšta bolnica - Veles | VE | C-SM | 183,58 | B |
| 6 | JZU Klinička bolnica - Tetovo | TE | HC | 196,78 | B |
| 7 | JZU Klinička bolnica - Štip | ST | C-SM | 678,59 | G |
| 8 | JZU Opšta bolnica - Kavadarci | KA | C-SM | 227,84 | B |
| 9 | JZU Opšta bolnica - Gostivar | GO | HC | 196,25 | B |
| 10 | JZU Opšta bolnica - Strumica | SR | C-SM | 297,30 | C |
| 11 | JZU Opšta bolnica - Struga | SU | HC | 529,01 | E |
| 12 | JZU Opšta bolnica - Kočani | KO | C-SM | 258,30 | B |
| 13 | JZU Klinička bolnica - Bitola | BT | HC | 254,17 | B |
| 14 | JZU Opšta bolnica - Gevgelija | GE | SM | 298,01 | C |
| 15 | JZU Opšta bolnica - Prilep | PP | HC | 174,31 | B |
| 16 | JZU Opšta bolnica - Debar | DR | HC | 109,91 | A |

Summary Overviews

Hospitals per climate zone, energy class, avg. PEC and average energy cost

| | Climate Zone | Avg. Temp | Temp. diff. | # | Avg. Primary Energy kWh/m2 /a | Energy Class | Avg. Cost for Primary Energy m2/a (EUR) in 2017 |
|---|--|-----------|-------------|---|-------------------------------|--------------|---|
| 1 | Hot Continental climate (HC) | 11,2 | -1,3 | 8 | 223,7 | B | 18,8 |
| 2 | Continental Sub-Mediterranean climate (C-SM) | 12,5 | / | 7 | 322,1 | C | 27,8 |
| 3 | Sub-Mediterranean climate (SM) | 14,5 | +2,0 | 1 | 298,0 | C | 33,0 |

Hospitals per energy class and average energy cost in 2017 + corr. for 2020

| Energy Class | Count | Avg. Cost m2/a @2017 (EUR) | Avg. Cost m2/a @2020 (EUR) |
|--------------|-----------|----------------------------|----------------------------|
| A | 1 | 12,43 | 7,65 ↓ |
| B | 7 | 13,56 | 12,94 ↓ |
| C | 4 | 24,35 | 18,28 ↓ |
| D | / | / | / |
| E | 2 | 31,52 | 34,35 ↑ |
| F | 1 | 46,98 | 37,60 ↓ |
| G | 1 | 63,32 | 46,18 ↓ |
| Average: C | Total: 16 | Average: 23,63 | Average: 20,24 |

Conclusions

2. With regards to the national objectives for nearly Zero-Energy Buildings (nZEB), North Macedonia has not defined any targets as at the publication of the 3rd Action Plan on Energy Efficiency 2016-2018.

However, the country will make efforts to support construction and promotion of such buildings, particularly in the public sector.

5. In terms of Avg. and TPEC per m² per annum, the hospitals in **Štip, Kumanovo, Kičevo** and **Struga** are the outliers with highest consumption and worst energy classification: **E, F, G, and E** respectively.

Nevertheless, this may be attributed to the fact that they are the mostly used hospitals, that is, they have the highest patient served per m² rate.

6. In terms of average and **total cost of energy per m² per annum**, energy efficiency measures have to be adopted for the hospitals in **Štip** and **Kumanovo**, and to a lesser extent for those in **Struga** and **Gevgelija**.

7. On the other hand, the other **12 hospitals are classified A (1), B (7) or C (4)**, which means only 25% of them require urgent energy efficiency measures.

Conclusions

9. Although nZEB is included in almost all of the national strategic documents, it is done mainly in context of intention. Nevertheless, in order to achieve/get closer to European nZEB targets, improvements are required in:

- **Legislation,**
- **Energy performance certificates in relation to nZEB standard,**
- **Supervision & Facilitation,**
- **Awareness, Best Practices & Training,**
- **Financial Incentives & Subsidies.**

10. With regards to the specific targets for hospitals prescribed by the **2014 RePublic ZEB Project for Refurbishment of the Public Building Stock towards nZEB** (EPBD implementation), involving 12 consortium partners from 11 European countries, the following was ascertained: **only 2 hospitals, those in Prilep and Debar, have values close to the recommended ones for nZEB, whereas the others require serious interventions and investments.**