Croatian experience in designing and financing multiapartment buildings (MAB) renovation programme

- link with EEOS -

Vesna Bukarica, Ph.D.

Workshop on Renovation of Multi-Apartment Buildings, Energy Community
on-line, 24th June 2021
Introduction

Programme for energy renovation of MAB 2014-2020
  • Main features of the Programme
  • Results and lessons learned

Programme for energy renovation of MAB 2021-2030
  • Targets as per Long-term Strategy for renovation of building stock targets
  • Challenges

Link with EEOS
Why focusing on residential sector?

CROATIAN BUILDING STOCK (HEATED AREA)

- Single Family Houses - SHF: 50%
- Multi-apartment Buildings - MAB: 27%
- Non-residential Buildings: 23%

TOTAL Heated area [m²]: 166,742,023

<table>
<thead>
<tr>
<th>Category</th>
<th>Heated area [m²]</th>
</tr>
</thead>
<tbody>
<tr>
<td>Single Family Houses - SHF</td>
<td>83,481,377</td>
</tr>
<tr>
<td>Multi-apartment Buildings - MAB</td>
<td>45,449,582</td>
</tr>
<tr>
<td>Non-residential Buildings</td>
<td>37,811,064</td>
</tr>
<tr>
<td>TOTAL</td>
<td>166,742,023</td>
</tr>
</tbody>
</table>

FINAL ENERGY CONSUMPTION

- Households: 34%
- Services: 12%
- Industry: 18%
- Agriculture and forestry: 3%
- Fishing: 3%
- Transport: 32%
- Agriculture and forestry: 3%
### Characteristics of Croatian residential sector and MAB

#### Construction period

<table>
<thead>
<tr>
<th>Construction period</th>
<th>Single-family houses</th>
<th>Multi-apartment buildings</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Q&lt;sub&gt;Wend&lt;/sub&gt; [kWh/m²]</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Continental</td>
<td>Coastal</td>
</tr>
<tr>
<td>&gt;1945</td>
<td>176</td>
<td>127</td>
</tr>
<tr>
<td>1945-1960</td>
<td>258</td>
<td>134</td>
</tr>
<tr>
<td>1961-1970</td>
<td>216</td>
<td>122</td>
</tr>
<tr>
<td>1971-1980</td>
<td>196</td>
<td>94</td>
</tr>
<tr>
<td>1981-1990</td>
<td>155</td>
<td>77</td>
</tr>
<tr>
<td>1991-2000</td>
<td>125</td>
<td>83</td>
</tr>
<tr>
<td>2001-2005</td>
<td>118</td>
<td>69</td>
</tr>
<tr>
<td>2006-2010</td>
<td>86</td>
<td>56</td>
</tr>
<tr>
<td>2011-2019</td>
<td>70</td>
<td>40</td>
</tr>
</tbody>
</table>

#### Energy class

<table>
<thead>
<tr>
<th>Energy class</th>
<th>A+</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>F</th>
<th>G</th>
<th>Worst performing MAB</th>
</tr>
</thead>
<tbody>
<tr>
<td>MAB</td>
<td>4,89%</td>
<td>20,70%</td>
<td>29,30%</td>
<td>21,40%</td>
<td>15,28%</td>
<td>5,80%</td>
<td>2,03%</td>
<td>0,60%</td>
<td>34%</td>
</tr>
<tr>
<td>Continental</td>
<td>1,07%</td>
<td>11,50%</td>
<td>31,54%</td>
<td>22,02%</td>
<td>20,53%</td>
<td>9,00%</td>
<td>3,37%</td>
<td>0,97%</td>
<td>34%</td>
</tr>
<tr>
<td>Coastal</td>
<td>10,29%</td>
<td>33,70%</td>
<td>21,14%</td>
<td>20,52%</td>
<td>7,87%</td>
<td>1,28%</td>
<td>0,13%</td>
<td>0,08%</td>
<td>30%</td>
</tr>
</tbody>
</table>
How to make residential sector more energy efficient? Croatian approach...

- **Government programmes** for energy renovation of residential buildings adopted in 2014

- **Public financing** ensured from national EE Fund from 40 to 80% of eligible costs (2014-2016) and 60% from EU funds (2017)

  - **Single family houses**
    - Contracted approx. 15,500 projects – approved grants > 659,5 million HRK (88 million €)
    - **Completed approx. 12,800 projects** – paid grants > 597,7 million HRK (80 million €)

  - **Multi-apartment buildings**
    - Contracted approx. 2,300 projects – approved grants > 279 million HRK (37 million €)
    - **Completed approx. 2,000 projects** – paid grants > 154 million HRK (20,5 million €)
    - **EU financing (ERDF) with 60% grants** – approx. 600 projects approved for financing
Croatian MAB renovation programme – national funding 2014-2016

GRANT PROGRAMME - GOVERNMENT

Government decision on adoption of the Programme for MAB renovation (based on the proposal of the Ministry of Construction)

EE Fund obliged by Gov. decision to allocate financing for implementation of Programme (money from emission trading) and to issue public tenders for grants (40-60-80% depending on the development index of the MAB location; 100% for documentation)

Building management companies respond to the calls on behalf of apartment owners and implements the project

Banking sector offers commercial loans for MAB renovation

COMMERCIAL LOANS - MARKET
Croatian MAB renovation programme – EU funding 2017-2020

GRANT PROGRAMME - GOVERNMENT
Operational Programme „Competitiveness and Cohesion 2014 -2020” for use of ERDF (70 M€)
Management Authority – Ministry of Regional Development and EU funds approves public calls and controls alignment with Operational Programme and administrative procedure

Intermediate body level 1 – Ministry of Construction defines eligibility and selection criteria and publishes the public call, signs the contracts and makes payments to MABs (grant 60% for energy renovation, 85% for documentation and project management) &

Intermediate body level 2 – EE fund administers the public call (checking eligibility and selection criteria), proposing decisions, co-signing the contracts, on-site checks and monitoring within 5 years &

EE fund – EE sector provides technical assistance to Building Management Companies in application and implementation

Building management companies respond to the calls on behalf of apartment owners and implements the project

Banking sector offers commercial loans for MAB renovation

COMMERCIAL LOANS - MARKET
Co-financing energy audits & certificates and project design documentation (until 2016)

• Building the project pipeline (2013-2015)
• One building – one request!
• Estimation of potentials and costs for implementation of EE measures
• Maximal subvention 200.000,00 HRK (35.000,00 HRK if building with one entrance)
• Energy audit and certificate must be done in accordance with Regulation and prescribed methodology
  • Ministry of Construction performs regular checks of audit reports and energy certificates -> possibility to loose licence if not done according to regulation
• Project design documentation – regulated by the Act on Construction
  • Obligatory calculation of energy savings to prove that 30% (50%) reduction in needed energy for heating of a building is achieved -> needed energy vs. used energy
• MAB that received subsidy for project documentation are obligated to renovate the building within 3 years - > ensuring the proper use of public money
• Results:
  • 1.347 energy audits and certificates
  • 915 project design documentation
Co-financing energy renovation of buildings (until 2016)

• One building – one request!
• Maximal subvention 1,400,000,00 HRK
• Application form – must provide data on calculated energy and emission savings (new, more detailed application form for EU funds purposes)
• One-time payment after works have been completed and documents delivered to the Fund - > ensuring use of public money for planned purpose!
  • Contract between the Fund and building management company published with the public call
  • Request for payment in standardised form
  • Final report with all data needed for input in the system for M&V
• EE Fund is entitled to perform on-site controls and to monitor effects of the project (energy savings) up to 5 years
• Results:
  • 430 renovated MAB
Co-financing energy renovation of MAB with EU funding from ERDF (from 2016)

- 60% co-financing for energy renovation works and supervision (calculated financing gap)
- 85% co-financing for energy audits, project documentation, project management
  - Refund of costs for energy audit before renovation and project documentation
- Minimal subvention 100,000,00 HRK
- Maximal subvention 13,000,000,00 HRK
- Min. 50% reduction of heating demand
- Only one public call in late 2016 – 70 million EUR -> 584 MAB
- Technical assistance by EE Fund (92% acceptance rate for applications)
- Results:
  - 542 renovated MABs
Each multi-apartment building in Croatia is obliged by law to contract a Building Management Company (BMC) responsible for maintenance services according to the contract. All apartment owners pay a monthly fee for building management – non-compliance is penalised by enforcement!

BMC is recognised by Government programmes as intermediaries between State institutions (Ministry, EE Fund) and apartment owners.

- BMC apply for co-financing on behalf of apartment owners with a proof that more than 50% of apartment owners (based on the share in the total surface of the building) agree with the renovation.
- BMC sign the contract for financing.
- BMC selects the contractor for works.
- BMC reports to the EE Fund.
Procedure for awarding co-financing

1. Ministry/EE Fund prepares and publishes public call for co-financing
2. BMC apply to the call with required documentation (energy audit and building certificate, project design, approvals) proving at least 30(50)% savings in heating demand
3. EE Fund evaluates applications and decide on awarding of co-financing
4. BMC procures contractor for works and supervision engineer
5. BMC agrees a loan with the bank (based on the building management fee)
6. EE Fund signs the contract for co-financing
7. Energy renovation works are carried out (EE Fund performs on-site controls on random basis)
8. After completion of works, BMC submits request for grant payment to the EE Fund with all required documentation (bills, approval from supervision engineer, energy certificates)
9. EE Fund pays the grant to the building account and monitors effects up to five years
Source: Environmental Protection and Energy Efficiency Fund
Promotion and awareness raising activities

- **Campaign included:**
  - Informative leaflets with information on EEmeasures that can be financed
  - Workshops with property management companies
  - More than 30 events throughout Croatia (both in 2015 and 2017)
  - Info office and toll free line for citizens
  - One-stop shop (EE Fund)
Finding the right solution for energy renovation of multi-apartment buildings...

- Construction/installation works
- Financing – grants and loans
- Appropriate information
- Technical assistance
Achieved vs. expected results 2014-2020

• Achievements:

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>New annual energy saving [PJ]</td>
<td>0,0210</td>
<td>0,2355</td>
<td>0,1825</td>
<td>0,1548</td>
<td>0,1103</td>
<td>0,3190</td>
<td>0,0157</td>
</tr>
<tr>
<td>Total annual savings in 2020 [PJ]</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1,0388</td>
</tr>
<tr>
<td>Total emission reduction CO₂ [t]</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>63,465,19</td>
</tr>
<tr>
<td>Cumulative savings 2014-2020 [PJ]</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>2,9120</td>
</tr>
<tr>
<td>Total investments [HRK]</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1.122.436.799,24</td>
</tr>
<tr>
<td>Total subsidies [HRK]</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>614.284.403,18</td>
</tr>
</tbody>
</table>

• Targets:

| CUMULATIVE TARGET (Art 7. EED) 2014-2020 [PJ] | 54,2500 |
| CUMULATIVE TARGET FOR ALTERNATIVE MEASURES [PJ] | 27,1830 |
| CUMULATIVE SAVINGS FROM MAB ENERGY RENOVATION PROGRAMME [PJ] | 5,1400 |

• 56,65% of targeted cumulative energy savings for MAB achieved
• Have we done something wrong?
  • Political will - Government programmes (base for OPCC) -> secured co-financing from national and EU funds
  • Continuous information and awareness raising
  • Administrative procedure – friend or foe?
  • We ran out of money... discontinuity of programme implementation (last call for co-financing in 2016/2017)
  • How much grant is sufficient?
    • EE is revenue generating activity: energy saving -> money saving = revenue
    • Cost – benefit analysis must be performed to reveal financing gap
    • Analysis showed that for residential sector grant of 60% is needed to make project financially viable!
  • **SEE reality:** poor economic conditions -> reduced heated area, high share of fuel wood in residential sector (>60% in SFH, >10% in MAB), relatively low energy prices, mistrust in institutions and banks...
• New Programme for 2021-2030 under preparation
• Targets and investments needed (Long-term strategy)

<table>
<thead>
<tr>
<th></th>
<th>2021</th>
<th>2022</th>
<th>2023</th>
<th>2024</th>
<th>2025</th>
<th>2026</th>
<th>2027</th>
<th>2028</th>
<th>2029</th>
<th>2030</th>
</tr>
</thead>
<tbody>
<tr>
<td>Targeted surface [10^6 m^2]</td>
<td>0,30</td>
<td>0,30</td>
<td>0,49</td>
<td>0,48</td>
<td>0,66</td>
<td>0,64</td>
<td>0,80</td>
<td>0,78</td>
<td>0,93</td>
<td>0,90</td>
</tr>
<tr>
<td>Investment [million HRK]</td>
<td>909,45</td>
<td>898,88</td>
<td>1,459,35</td>
<td>1,438,20</td>
<td>1,966,95</td>
<td>1,914,08</td>
<td>2,411,10</td>
<td>2,337,08</td>
<td>2,781,23</td>
<td>2,686,05</td>
</tr>
<tr>
<td>Ukupno 2021 -2030 [million HRK]</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>18.802,35 (2,5 billion EUR)</td>
<td></td>
</tr>
<tr>
<td>Ukupno 2021 -2024 [million HRK]</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>4.705,88</td>
<td></td>
</tr>
</tbody>
</table>

• Much higher art.7 EED target (54 vs.125 PJ)
  • 70% of art.7 target to be achieved by EEOS, while 30% by alternative measures
  • Programme for MAB is alternative measure -> expected savings approx. 22,5% of national cumulative savings target for alternative measures, which equals approx. 6,8% total national cumulative target
• Increase in prices of construction works: 51% between 2014 and 2019!
  • With stable energy prices in the same period
• Combination of energy and structural renovation -> earthquake!
  • Huge increase in costs that are not possible to be recovered by energy cost savings (1.500 HRK/m² -> 3.500 HRK/m²)
• Availability of public financing
  • National Plan for Recovery and Resilience – 1 billion HRK to be divided between public and MAB
  • New OPCC for the use of ESI funds still under development
  • National EE Fund to be used for other purposes (e.g. SFH)
• Blending public and private money – loans with performance based grant component?
• Broadening the scope of measures (e-mobility, fire protection, indoor climate, accessibility)
• Stronger technical requirements – from 50% Q_{H,nd} to 50% E_{prim} -> nZEB renovation?
Main info on EEOS in Croatia
  - Functional since 2019 - > only 2 years of experience
  - Obligated parties all suppliers of electricity, natural gas, heat and oil derivatives with annual sales > 50 GWh (300 -> 100 -> 50 GWh)

Until 2020 no focus on MAB from obligated parties

High targets for period 2021-2030 might change this situation
  - 70% of national Art. 7 targets shall be achieved by EEOS

Expected developments
  - Heat suppliers to undertake measures in MAB connected to DHS (reconstructions of heat substations, regulation of systems
  - PV installations on MAB (new RES Law in procedure)
  - Actions for vulnerable customer and customers on underdeveloped areas (increase of savings by 20 or 10%, respectively)
Thank you for your attention!
At your disposal for questions and discussion...

Vesna Bukarica, Ph.D.
Energy Institute Hrvoje Pozar
Department for Energy Efficiency

Savska cesta 163, 10001 Zagreb, P.O.Box. 141, Croatia
phone:  +385 1 6326 134
mob:  +385 99 5326 134
web:  www.eihp.hr
e-mail: vbukarica@eihp.hr