

# Priprema građevinskog sektora za nZEB

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ZGRADE  
2020+

# Megatrends which create imperative for change



Energy and climate change  
**30%** of global greenhouse gas emissions are attributable to buildings

Urbanization & housing crisis  
**200K** people are added daily to urban areas and need affordable and healthy housing

**No. 1** consumer of global raw materials is the construction industry

Resource scarcity

**\$1 tn** Huge infrastructure gap  
annual investments are needed to close the global infrastructure gap

Demand shift to emerging countries  
**65%** of the next decade's growth in construction will happen in emerging countries

Talent gap and ageing workforce  
**50%** of general contractors are concerned about finding experienced crafts workers

Michael Burke,  
Chairman and CEO of AECOM



"Current business models, strategies and capabilities will not be sufficient in any of these future worlds", says Michael Burke, Chairman and CEO of AECOM and Co-Chair of the World Economic Forum Infrastructure and Urban Development community.

"Players along the construction value chain need to prepare strategically to thrive in the face of anticipated disruption."

To keep up, attracting new talent and improving the skills of the existing workforce were deemed priorities by 74% of industry CEOs at the 2018 World Economic Forum in Davos. Improving integration and collaboration along the value chain (65%) and adopting advanced technologies at scale (61%) were other key actions they considered.

# Dinamika realizacije obnove nacionalnog fonda zgrada

- izrađena je kako bi se zadovoljili ciljevi energetske ušteda zadani
  - Nacrtom Četvrtog Nacionalnog akcijskog plana energetske učinkovitosti Republike Hrvatske i
  - Energetskog putokaza Europske unije do 2050. godine (engl. Energy Roadmap 2050).
- Dinamika obnove je okvirno pretpostavljena te se odvija u nekoliko različitih faza:
  - **Od 2017.-2029.** obnova će se odvijati dinamikom od **3,5% godišnje**;
  - **Od 2030.-2039.** stopa obnove odvijat će se dinamikom od **3,0% godišnje**;
  - **Od 2040.-2049.** dinamika obnove smanjit će se na **1,5% godišnje**;

# Izravan učinak programa obnove nacionalnog fonda zgrada na zapošljavanje u građevinarstvu

- do (uključivo i) 2020. mogao bi iznositi i do **26 000 novih radnih mjesta**.
  - veliko povećanje u odnosu na trenutni broj zaposlenih.
  - Tvrtke registrirane u građevinarstvu potkraj 2016. imaju **68 653 zaposlena**
- Prema posebnom izvještaju DZS-a o građevinarstvu,
  - prosječni **broj radnika na gradilištima u 2015. godini iznosio je 41 037** i još uvijek se nalazio u padu u odnosu na ranije godine.
  - Program obnove nacionalnog fonda mobilizira i projektante, inženjere, menadžere i administrativno osoblje,
- **jasno je da se radi o velikoj mobilizaciji resursa, osobito rada u graditeljstvu.**
  - Potencijal mobilizacije može se grubo procijeniti **na 40-50% trenutnog angažmana resursa u građevinarstvu.**

**IZVOR:** Nacrt Dugoročne strategije za poticanje ulaganja u obnovu nacionalnog fonda zgrada Republike Hrvatske, MGIPU, rujan 2017.

# Izravan učinak programa obnove nacionalnog fonda zgrada na zapošljavanje u građevinarstvu

**Tablica 6.9** Vrijednost izvršenih građevinskih radova na zgradama 2013.-2015., pravne osobe s više od pet zaposlenih

mil HRK	2013.	2014.	2015.	2015./2014. (indeks)
Vrijednost građevinskih radova				
Novogradnja	3.944	3.960	4.287	108
Rekonstrukcije, adaptacije i veliki popravci	1.878	2.152	2.510	117
Održavanje i manji popravci	439	418	444	106

Izvor: DZS, SI 1563, Građevinarstvo u 2015.

**IZVOR:**  
Nacrt Dugoročne strategije za poticanje ulaganja u obnovu nacionalnog fonda zgrada Republike Hrvatske, MGIPU, rujna 2017.

- gotovo cjelokupan iznos novih ulaganja predviđen programom obnove nacionalnog fonda stambenih zgrada **odnosi na rekonstrukcije, adaptacije i velike popravke**,
  - u ovom segmentu treba doći do **približno 500 % povećanja aktivnosti u dugom roku.**
- Vrlo velika mobilizacija resursa koja se neće dogoditi ako bude prepuštena spontanim tržišnim procesima.
- Neophodne su koordinirane mjere koje će na strani potražnje stvoriti poticaje za ulaganja u obnovu zgrada, a na strani ponude **poticaje za premještanje resursa u građevinske aktivnosti u zgradarstvu.**

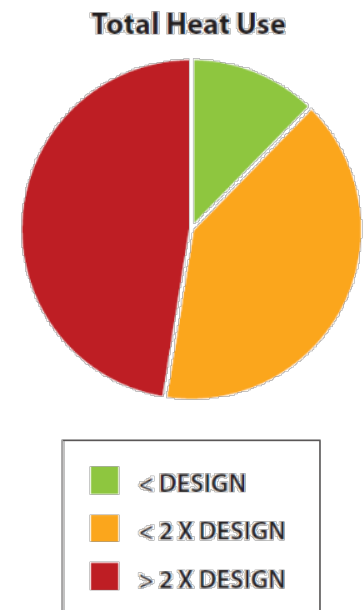
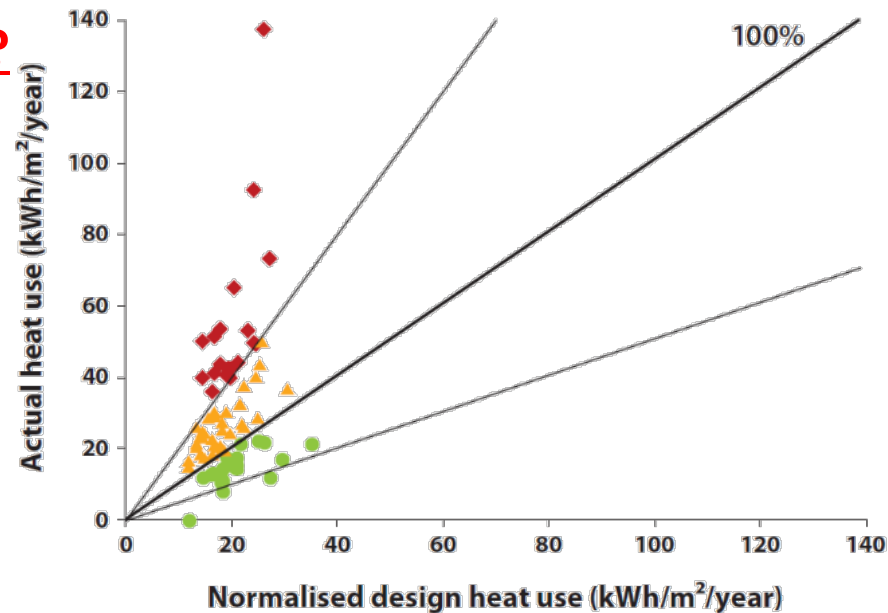


**One of the most significant problems of the construction market in Croatia is the lack of competences on NZEB.**  
**(all participants in construction projects)**



# Rezultat - Stvarna & projektirana potrošnja

- Usporedba projektirane potrošnje i stvarne potrošnje
- Uzroci:
  - metoda proračuna
  - korištenje
  - **IZVOĐENJE???**



Source: Ghent University



# Nadopuna EPBD II

- (10) According to the Commission's impact assessment, renovation would be needed at an average rate of 3 % annually to accomplish the Union's energy efficiency ambitions in a cost-effective manner. Considering that every 1 % increase in energy savings reduces gas imports by 2,6 %, clear ambitions for renovation of the existing building stock are of great importance. Thus, efforts to increase the energy performance of buildings would contribute actively to the Union's energy independence and, furthermore, have great potential to create jobs in the Union, in particular in small and medium-sized enterprises. In that context, Member States should take into account the need for a clear link between their long-term renovation strategies and pertinent initiatives to promote skills development and education in the construction and energy efficiency sectors.

- (6) In Article 10, paragraph 6 is replaced by the following:

"6. Member States shall link their financial measures for energy efficiency improvements in the renovation of buildings to the *targeted or achieved* energy savings, *as determined by one or more of the following criteria:*

- (a) *the energy performance of the equipment or material used for the renovation; in which case, the equipment or material used for the renovation is to be installed by an installer with the relevant level of certification or qualification;*





# Fit-to-NZEB

*Innovative training schemes  
for retrofitting to nZEB-levels*

[www.fit-to-nzeb.com](http://www.fit-to-nzeb.com)

Koordinator: **EnEffect** 

Center for Energy Efficiency EnEffect – Bulgaria

# WP4 - Training programmes for institutions of higher education

- Razvoj novih programa edukacije koji su u **skladu s EQF razinama 6 i 7**
- Razvoj potrebnog **nastavnog sadržaja** (learning content):
  - Definirati programsku povezanost,
  - Nastavni materijali
    - Prezentacije,
    - Praktične vježbe
    - 3D vizualizacije
    - Video materijali
    - E-learning
    - Način provođenja ispita
- Provesti **barem 3 pilot edukacije**



# F2NZEB: Learning Outcomes

Planning and design instruments

Project management  
Quality assurance

Step-by-step retrofit plans

Ecology and Sustainability

Conservation of historic building fabric

Achieving measurable results

RES  
• Energy storage

Optimal solar gains

Basics of building physics  
• Passive house principles

Engaging stakeholders

Building services  
• MVHR  
• Heating and Cooling  
• DHW  
• Control & Automation  
• Lighting

**Energy retrofit  
nZEB**

Building Envelope  
• Thermal insulation  
• Minimizing thermal bridges  
• Highly efficient windows

Cost effectiveness

NZEB Neighborhoods  
• Distributed energy production & EMS  
• Energy cooperatives

Airtightness, vapour and moisture movement, windtightness

Comfort, health and safety (incl. IAQ)  
- Summer comfort / passive cooling strategies  
- Fire safety

Energy efficiency and building renovation policies





# Kako je to u Njemačkoj, Irskoj,...?







# The German Contractor's Declaration



- New obligatory scheme
- Requires contractors to confirm in writing that the specific minimum energy performance requirements
  - for building envelope components,
  - space heating and hot water generation and distribution systems and
  - newly installed cooling and ventilation systemsare met during the realisation of a renovation measure.
- Infringements lead to fines

Template

Mr/Mrs. Company

.....  
(Place, Date)

**Contractor's Declaration according to § 26a of the German Energy Saving Ordinance (EnEV) 2009**

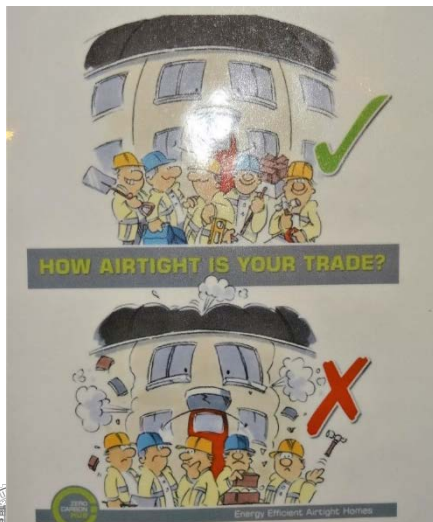
Building/Invoice as of:  
.....

Dear Madam, dear Sir,  
Hereby we confirm that the modifications or installations of building components performed by us are in accordance with the requirements of the German Energy Saving Ordinance (EnEV) 2009:

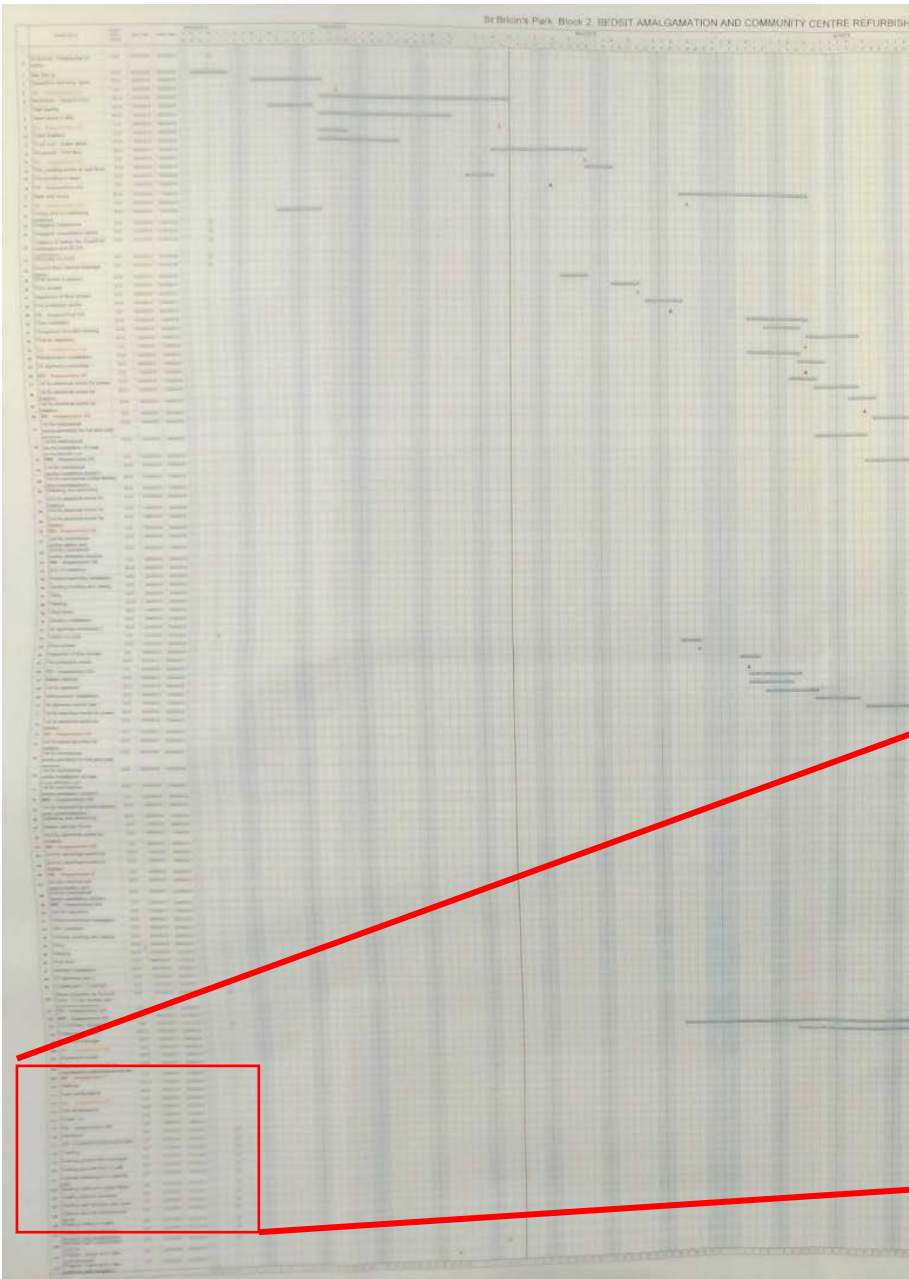
external insulation layers installed  
 external insulation layers renewed  
 internal insulation layers installed  
 internal insulation layers renewed

This contractor's declaration has to be kept available by you, the building owner, for at least 5 years and has to be provided to the responsible authority on request.

.....  
Signature of the company







100	Same schedule as Ground Floor - To be revised with proposed drawings	0.00	31/01/2018	31/01/2018
101	<b>FS - Inspection 04</b>	0.00	02/05/2018	02/05/2018
102	<b>ME - Inspection 05</b>	0.00	04/07/2018	04/07/2018
103	EXTERNAL WORKS	8.00	31/01/2018	31/01/2018
104	External insulation	304.00	27/03/2018	22/05/2018
105	External drainage	120.00	10/04/2018	30/04/2018
106	<b>SE - Inspection 06</b>	0.00	25/04/2018	25/04/2018
107	Aluminium works	160.00	17/05/2018	13/06/2018
108	External service ducts for gas/electric/cable/telephone etc	64.00	14/06/2018	25/06/2018
109	<b>EE - Inspection 7</b>	0.00	27/06/2018	27/06/2018
110	Railings	120.00	01/05/2018	22/05/2018
111	Hard landscaping	96.00	14/06/2018	29/06/2018
112	<b>SE - Inspection 07</b>	0.00	09/05/2018	09/05/2018
113	Soft landscaping	56.00	27/06/2018	05/07/2018
114	Power on	8.00	21/05/2018	21/05/2018
115	<b>FS - Inspection 05</b>	0.00	13/06/2018	13/06/2018
116	Handover	8.00	31/01/2018	31/01/2018
117	AIR TIGHTNESS BREAKDOWN	8.00	31/01/2018	31/01/2018
118	Flooring	8.00	31/01/2018	31/01/2018
119	Sealing ground floor services	8.00	31/01/2018	31/01/2018
120	Sealing ground floor to wall	8.00	31/01/2018	31/01/2018
121	Internal plastering for internal wall	8.00	31/01/2018	31/01/2018
122	Sealing walls and upper floors	8.00	31/01/2018	31/01/2018
123	Sealing around windows	8.00	31/01/2018	31/01/2018
124	Sealing wall services and opes	8.00	31/01/2018	31/01/2018
125	Sealing around windows and doors	8.00	31/01/2018	31/01/2018
126	Sealing ceiling to walls	8.00	31/01/2018	31/01/2018
127	Sealing around services through roof penetrations	8.00	31/01/2018	31/01/2018
128	IMPORTANT ORDERING DATES	0.00	05/03/2018	05/03/2018
129	Prepare, check and order door/windows	8.00	05/03/2018	05/03/2018
130	Prepare, check and order external wall insulation	8.00	27/02/2018	27/02/2018



# Potencijalni uzroci problema

- Uzroci problema su često:
  - veliki broj podizvođača i obrtnika kojima nedostaje znanja o usklađenosti poslova s drugim izvođačima (**cross-crafting**),
  - Nedostatak vremena za međusobnu komunikaciju i koordinaciju pri rješavanju problema koji su **novi i/ili drugačiji**.
  - nekoordiniranosti ili pak „pogrešnog“ redoslijeda izvođenja radova uzrokuju štetu, pri čemu je često **vrlo teško odrediti odgovornost**.
- Zbog svega navedenog, kvaliteta izvedenih radova, pogotovo u dijelu energetske učinkovitosti, **može biti upitna**.





- **Može li** nam BIM pomoći u rješavanju nekih od prikazanih problema?





Network for Using BIM  
to Increase Energy Performance

[www.net-ubiep.eu](http://www.net-ubiep.eu)

Koordinator:



Agenzia nazionale per le nuove tecnologie,  
l'energia e lo sviluppo economico sostenibile

# Ciljevi projekta Net-UBIEP



- Net-UBIEP nastoji doprinijeti povećanju energetske učinkovitosti u zgradama promoviranjem korištenja BIM-a tijekom cjelokupnog životnog ciklusa zgrade.
  - BIM – building information management

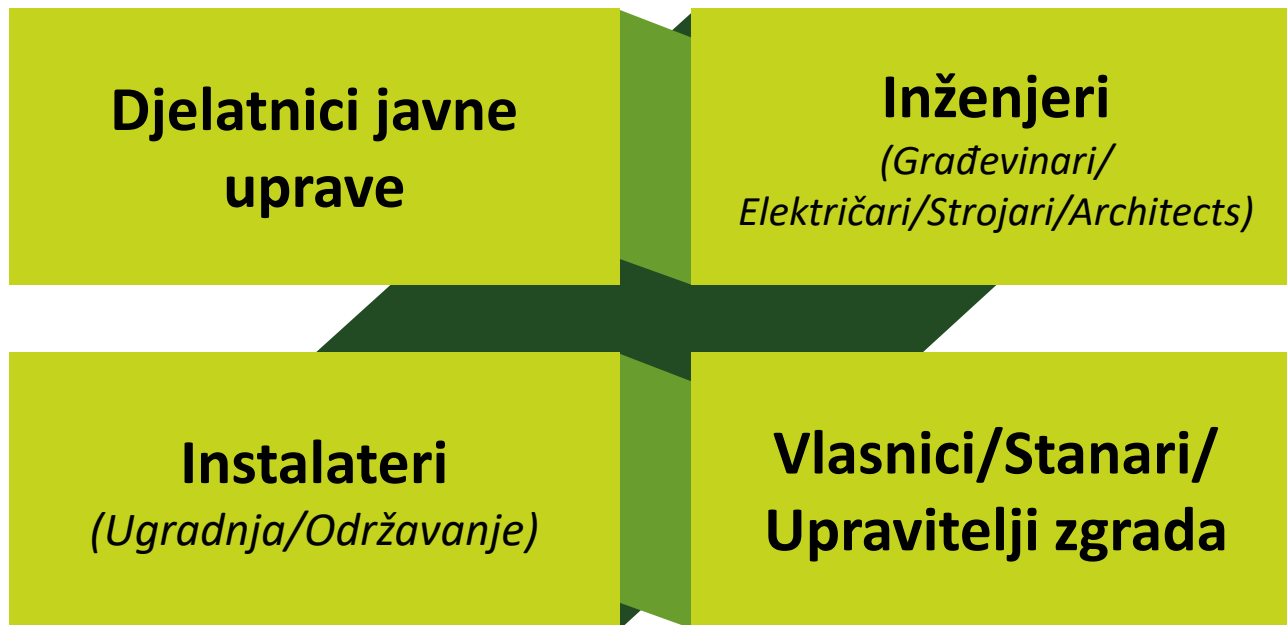
Better **management of the information** during the whole life cycle of the building is absolutely necessary in order to **avoid mistakes** and **have trustful information** at any time / when an intervention is necessary.



# Ciljane skupine



- **Tehnologija, ali i ljudi!**
- Svi sudionici u gradnji i korištenju zgrada moraju biti svjesni svoje uloge u prikupljanju, upravljanju i čuvanju potrebnih informacija vezanih uz energetska učinkovitost



# Net-UBIEP ciljevi

- Projekt je usredotočen na
  - Procese
  - Razumijevanje BIM-a
- Ne na specifične alate



Predstaviti prednosti korištenja BIM-a, ali i probleme koji još uvijek postoje i rješavaju se.

# Nedostatak znanja i standarda o procesima poduprtima BIM-om

# Provođenje

Seminari o strategijama provedbe BIM-a

Tečajevi o implementaciji energetske učinkovitosti korištenjem BIM-a

Online tečajevi o korištenju BIM-a kroz životni ciklus zgrada

Seminari o poboljšanju energetske učinkovitosti i upravljanju sustavima pomoću BIM-a

# Validacijske radionice!

- Validirajte naše trening materijale!
- Pomozite nam da ih poboljšamo!
- Naučite o BIM-u





s for the different targets



The Net-UBIEP brochure has been published

11 January 2018



Kick-off Meeting of Net-UBIEP

10 January 2018

SIGN UP FOR AN ACTIVE PARTICIPATION IN THE NET-UBIEP PROJECT

to Increase the Energy Buildings Performance

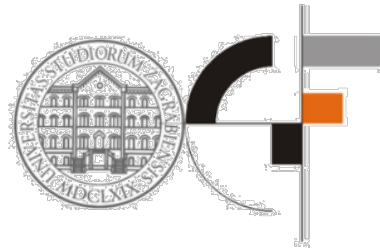
Increasing energy performance of buildings by wide spreading and strengthening the use

of the building. The use of BIM will allow to simulate the energy performance of

HORIZON 2020

Pratite nas...

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GRAĐEVINSKI FAKULTET

UNIVERSITY OF ZAGREB  
FACULTY OF CIVIL ENGINEERING

# Hvala na pažnji!



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