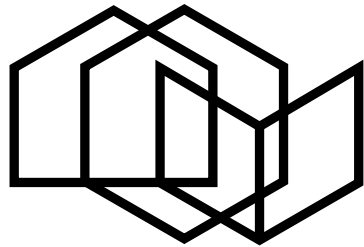
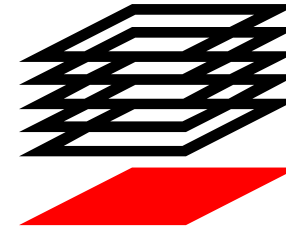


# Hrvatska komora inženjera strojarstva kao partner u EU projektu PROF/TRAC

Croatian Chamber of Mechanical Engineers as a member of PROF/TRAC team



**PROF / TRAC**



**HKIS**

Autori:

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Prof.dr.sc. Branimir Pavković, dipl.ing.stroj.  
Mr.sc. Luka Čarapović, dipl.ing.stroj.



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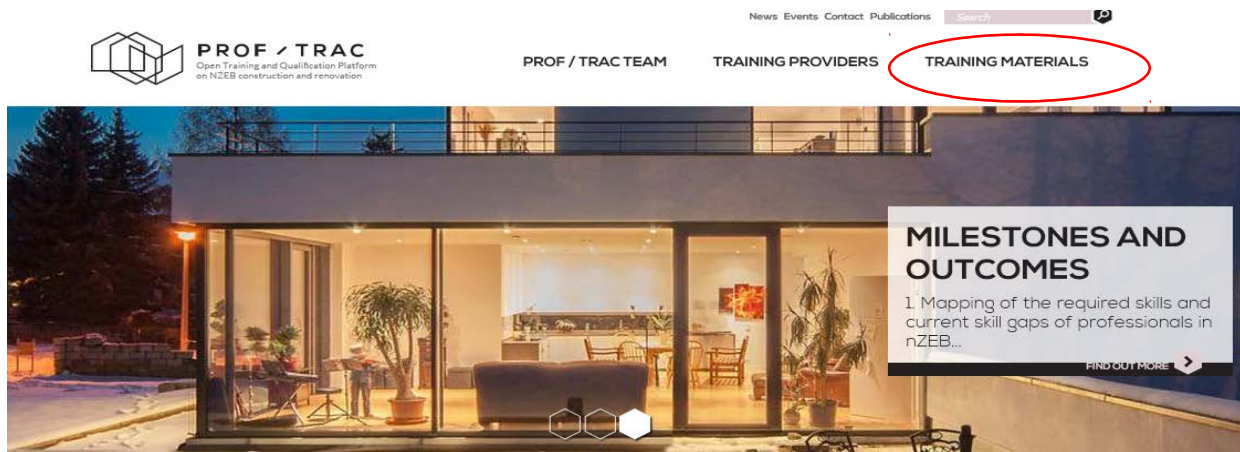


Hrvatska komora inženjera strojarstva  
Croatian chamber of mechanical engineers

# Horizon 2020 projekt pod nazivom "PROFessional multi-disciplinary TRaining and Continuing development in skills for NZEB principles

<http://proftrac.eu/open-training-platform-for-nzeb-professionals.html>

jedan od partnera je i HKIS – Hrvatska komora inženjera strojarstva



## ABOUT PROF / TRAC



PROF / TRAC will develop an Open Training and Qualification Platform for professionals dealing with nearly zero energy buildings.

### PROF / TRAC in a nutshell



PROF / TRAC targets technical experts, architects and managers involved in nZEB design and construction. The developed European training and qualification scheme will be part of a life-long-life learning process for continuous development and up-skilling of professionals.

[View details >>](#)

### TtT PROGRAMME



PROF/TRAC developed a European Train-the-Trainers (TtT) Program to facilitate the efficient use, adaptation and implementation of the EU level training materials, existing training structures, and certification schemes into national CPD programmes. The TtT program will also educate ambassadors of the PROF/TRAC scheme, who can initiate and organize the local training programs and can train the trainers on the national scale.

[View details >>](#)

### Milestones and outcomes



1. Mapping of the required skills and current skill gaps of professionals in nZEB
2. Development of an Open Training Platform and Qualification scheme
3. Train the Trainers programme for training provider REHVA and ACE members...

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# PROF / TRAC

Uspješan proces projektiranja, gradnje i obnove zgrada u cilju ispunjavanja zahtjeva za zgrade gotovo nulte energije (**GOEZ – nZEB**) zahtijeva **integralni pristup** projektiranju i rad u multidisciplinarnim timovima.

PROF-TRAC osigurava rješenje za prevladavanje prepreka takvom pristupu kroz razvoj i održavanje **otvorene edukacijske platforme** za obuku i trajno stručno usavršavanje profesionalaca u sektoru graditeljstva:

- inženjeri strojarke, elektro i građevinske struke
- arhitekti
- upravitelji zgrada i korisnici

Razvijena **Europska kvalifikacijska shema** biti će dio procesa cjeloživotnog učenja za trajni razvoj i usavršavanje profesionalaca.



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Internetske stranice projekta PROF/TRAC sadrže brojne dostupne materijale za obuku iz ranijih EU projekata.

News Events Contact Publications Resources

 **PROF / TRAC**  
Open Training and Qualification Platform  
on NZEB construction and renovation

[PROF / TRAC TEAM](#)   
 [TRAINING PROVIDERS](#)   
 [TRAINERS AREA](#)   
 [TRAINING MATERIALS](#)

## TRAINING MATERIAL REPOSITORY

On this page you can find all relevant training materials on NZEB. Use the filter form on the left to narrow the results.

Topic  
Select topic ▼

Type of project  
Select one... ▼

Building use  
Select one... ▼

Type of material  
Select one... ▼

Language  
Select one... ▼

[Filter result >>](#)

Relevant report	Topic	Project	
The Comfort Houses: Measurements And Analysis Of The Indoor Environment And Energy Consumption In 8 Passive Houses 2008-2011	Energy reduction	ZEB	<a href="#">More details</a>
Energineutralt Byggeri - Definition og fremtidig rolle i samfundet	Energy management	ZEB	<a href="#">More details</a>
Energineutralt Byggeri - Designprincipper og byggede eksempler for enfamiliehuse	Energy management	ZEB	<a href="#">More details</a>
Energineutralt Byggeri - Tekniske løsninger	Energy management	ZEB	<a href="#">More details</a>
Zero Energy Buildings - DESIGN PRINCIPLES AND BUILT EXAMPLES	Energy management	ZEB	<a href="#">More details</a>
Survey Findings Report	Awareness of energy efficiency	TRB	<a href="#">More details</a>
Final conclusions report	Awareness of energy efficiency	TRB	<a href="#">More details</a>



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# ZAŠTO PROF / TRAC:

Prepreke kod gradnje i obnove nZEB (G0EZ)

- **Nesklad između raspoloživih i potrebnih znanja i vještina** kao i sposobnosti managementa profesionalaca zbog nedostatka specifične obuke i obrazovanja
- Mnogi profesionalci u sektoru graditeljstva imaju tek **ograničenu prethodnu obuku, znanja i vještine** o projektiranju energetski učinkovitih zgrada i nZEB principima.
- **Suradnja** među različitim strukama i profesionalcima u gradnji još uvijek **nije uobičajena**.
- Profesionalcima uključenim u graditeljstvo **nedostaju** prave **informacije o** raspoloživim **kvalifikacijama i materijalima** za obuku.
- **Ne postoje lista i pregled potrebnih vještina i raspoloživih kvalifikacija** specifičnih ciljnih grupa. Većina raspoloživih programa obuke fokusirana je na specifičnu ciljnu grupu i jednu tehniku ili koncept.
- **Materijali za obuku** (obrazovanje i naknadna obuka) kreiraju se **ad-hoc** bez konsenzusa o potrebnom baznom kvalifikacijskom okviru.
- **Materijali za obuku** (obrazovanje i naknadna obuka) su raspoloživi, ali **treba ih održavati i obnavljati** da bi obuka bila održiva i prikladna za cikluse cjeloživotnog učenja.



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# Četiri glavna cilja projekta PROF/TRAC

## 1. Mapiranje potrebnih i nedostajućih znanja profesionalaca o nZEB

To uključuje mapiranje i vrednovanje:

- Profesionalaca uključenih u gradnju i obnovu nZEB i usporedbu potrebnih s postojećim znanjima.
- Postojećih kvalifikacija, izvora znanja, obrazovnih programa, post inicijalnih obuka i struktura za akreditaciju.
- Za mapiranje nedostajućih znanja koristiti će se metodologija iz nacionalnih BuildUp programa.

## 2. Razvoj otvorene edukacijske platforme i metoda za sustavni i održiv pristup znanju

Srž projekta je razvoj lako dostupne otvorene edukacijske platforme sa sljedećim funkcionalnostima:

- Informacije o europskom programu obuke, trenerima i organizacijama koje provode obuku.
- Informacije o profilima profesionalaca za gradnju nZEB.
- Informacije o certificiranim profesionalcima.
- Europska platforma za učenje profesionalaca u graditeljstvu s online alatima za obuku.

## 3. Razvoj programa obuke trenera za razvijene kvalifikacijske sheme

Središnji program obuke trenera organiziran je na međunarodnoj razini od strane europskih krovnih organizacija koje predstavljaju profesionalce u sektoru graditeljstva: inženjere (REHVA), arhitekte (ACE) i upravitelje potvrđene od Housing Europe. PROF/TRAC će omogućiti masovno usavršavanje kroz obuku veće grupe „predvodnika” kako bi se kreirao efekt „grude snijega”.

## 4. Razvoj „skladišta” materijala za obuku koji će se koristiti u obrazovanju i post inicijalnom obrazovanju

Da bi akcije u okviru projekta PROF/TRAC bile održive, nakon isteka projekta na otvorenoj platformi biti će kreirano „skladište” u kojem će se spremati, održavati i obnavljati materijali za obuku.



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# Pristup projekta PROF/TRAC

Pristup je zasnovan na četiri temeljna stupa:

Korištenje uspješne strukture uspostavljene za **mapiranje postojećih i potrebnih kvalifikacija** i identifikaciju nedostajućih vještina.

BuildUp Skills

Efikasno korištenje, adaptacija i implementacija postojeće infrastrukture i **materijala za obuku, te kvalifikacijskih programa** u cilju ostvarenja izravne i brze primjene.

IDES-EDU  
Powerhouse

**Izravno uključivanje najvažnijih Europskih krovnih organizacija za pojedine sektore** u cilju dobivanja široke EU podrške zainteresiranih profesionalnih grana i osiguranje održivosti nakon završetka projekta.

REHVA  
ACE  
Housing Europe

Brz i učinkovit početak **centralne obuke trenera radi stvaranja „ambasadora“** koji mogu inicirati i organizirati nacionalne programe obuke i obučiti trenere na nacionalnoj bazi u cilju kreiranja „**efekta snježne grude**“

Članovi kao  
pružatelji  
usluge na  
nacionalnoj  
razini



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# Tko smo mi?

## PROF/TRAC konzorcij

	<b>Sudionici projekta</b>			
1	Huygen Installatie Adviseurs	HIA	NL	<b>Koordinator</b>
2	Federation of European Heating, Ventilation and Air Condition Associations	REHVA	EU	<b>EU strukovne asocijacije</b>
3	Architects' Council Europe	ACE	EU	
4	Housing Europe	HE	EU	
5	ISSO	ISSO	NL	<b>Osiguravanje metodologije i stručnih znanja</b>
6	Valencia Institute of Building	IVE	ES	
7	Czech Technical University Prague	CVUT	CZ	
8	Aalborg University	AAU	DK	
9	DANVAK	DANVAK	DK	<b>Provedba obuke</b>
10	Croatian Chamber of Mechanical Engineers	HKIS	HR	
11	Spanish Technical Association of HVAC and Refrigeration	ATECYR	ES	
12	TVVL	TVVL	NL	
13	Czech Chamber of Chartered Engineers and Technicians	CKAIT	CZ	
14	Chamber of Architecture and Spatial Planning of Slovenia	ZAPS	SI	
15	Italian Chamber of Architects	CNAPPC	IT	



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Dosada su održana tri projektna sastanka: jedan u Bruxellesu, 23. i 24. ožujka 2015., drugi u Ljubljani 29. i 30. rujna 2015., a treći u Valenciji 8. i 9. ožujka 2016. Rad na „mapiranju” priveden je kraju: popis institucija koje pružaju obuku u području gradnje gotovo nula energetskih zgrada, te vještina i znanja inženjera u tom području, kao i izrada planova provedbe obuka nakon završetka projekta. Održana je i prva obuka predavača u Pragu u veljači 2016. godine. Pripremljene su i provedene prve pilot obuke stručnjaka. U trajanju projekta će se u RH provesti jedna obuka trenera (rujan 2016.) i dvije pilot obuke od kojih je prva održana u srpnju 2016. godine.



Projektni tim PROF/TRAC, prvi sastanak u Bruxellesu



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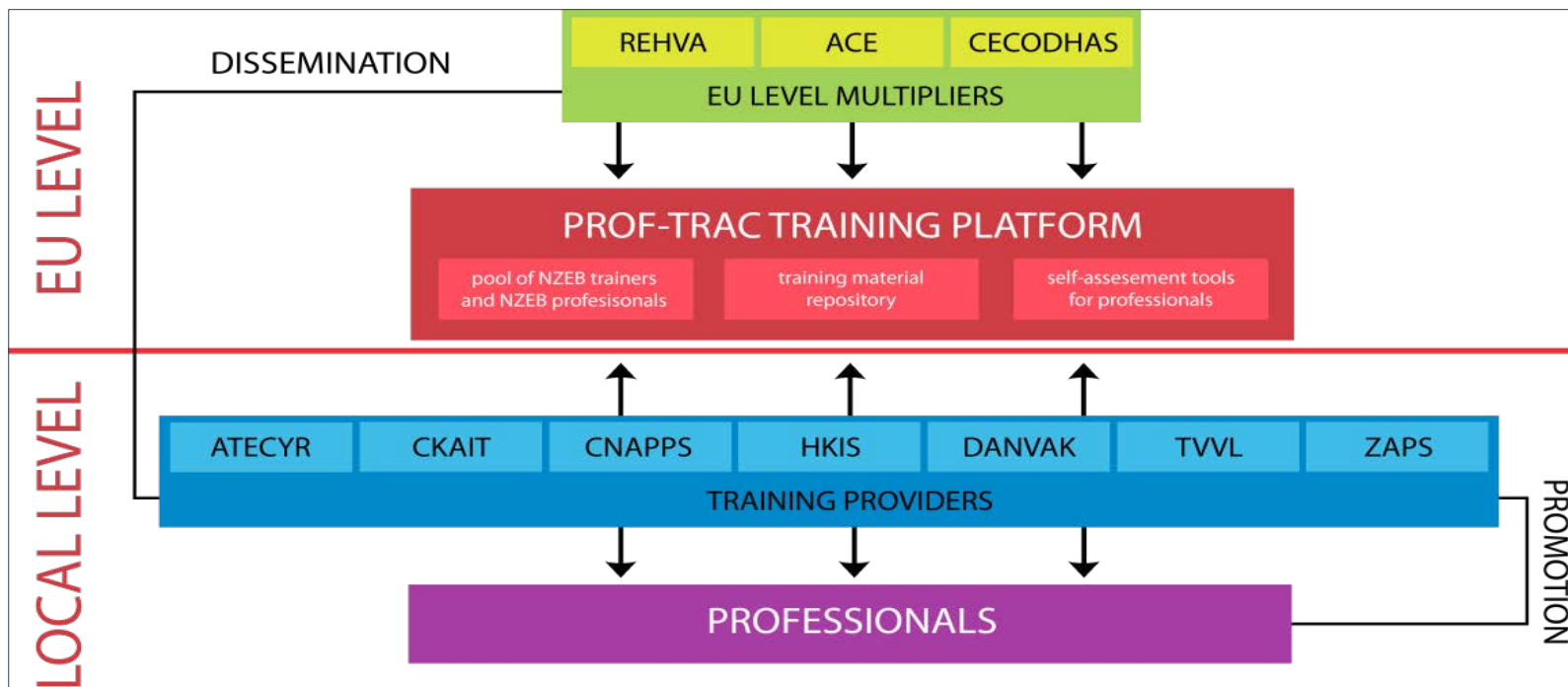
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## Projekt se provodi kroz radne pakete, za koje su osnovni ciljevi sljedeći:

- Utvrđivanje potrebnih i nedostajućih znanja i vještina, te broja raspoloživih profesionalaca koji se bave s nZEB u državama iz kojih potječu članovi projektnog tima
- Uspostava otvorene platforme za obuku i način provedbe vrednovanja stečenih znanja
- Obuka trenera za definirane nastavne programe i kvalifikacijske sheme
- Provedba pilot obuka u državama iz kojih potječu partneri projekta
- Razvoj baze materijala za obuku za uporabu u edukaciji i cjeloživotnom obrazovanju
- Diseminacija i publikacija rezultata



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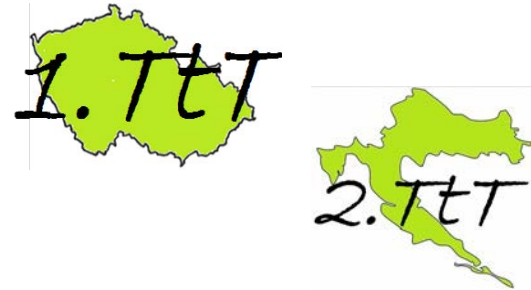
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# Program obuke trenera - Train the Trainers Programme

PROF/TRAC organizira središnji 'Train the Trainers' program radi uspostave zajedničkog okvira i obuke „ambasadora” projekta.

- Prva TtT obuka u Pragu, 15. – 17. veljače 2016.
- Druga TtT obuka u Zagrebu, 19. – 21. rujna 2016.
- Treća TtT obuka u Valenciji, proljeće 2017.
- Četvrta i peta obuka provesti će se u obliku webinarara



Obučeni treneri (ambasadori) biti će osposobljeni za obuku profesionalaca i trenera na nacionalnoj razini.

Nakon TtT programa na EU razini, obučeni treneri s nacionalnim udrugama koje provode obuku razvijaju i ostvaruju nacionalne pilot programe obuke bazirane na posebnim potrebama za nedostajućim znanjima i vještinama proizašlim iz mapiranja za pojedinu zemlju.



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# Pilot obuke

- Sedam pilot obuka u Danskoj, Nizozemskoj, Španjolskoj, Italiji, Češkoj, Sloveniji i Hrvatskoj
- Na prvoj TtT obuci u Pragu, treneri su kreirali specifične programe pilot obuka u skladu s potrebama proizašlim iz mapiranja za pojedinu zemlju. Naš program je baziran na iskazanom nedostatku vještina vezanih na timski rad i integralno projektiranje, te nedostatno specijalizirano znanje za projektiranje i gradnju nZEB zgrada



Zašto pilot obuke?

- Specifična uloga pilot obuke je praćenje i evaluacija pristupa projekta. Pilot obuke bi trebale rezultirati povratnom informacijom za poboljšanje programa obuke i materijala za obuku

Tko treba sudjelovati na pilot obukama?

- Inženjeri, arhitekti i upravitelji u zajedničkom radu

U zagrebu je, od 14.-16. 07. 2016. godine održana pilot obuka na kojoj je sudjelovao 31 polaznik (7 arhitekata, 7 strojara, 6 građevinara, 6 električara, 3 upravitelja zgrada i 2 predstavnika MGIPU)



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# Prva TtT obuka u Pragu, 15. – 17. veljače 2016.



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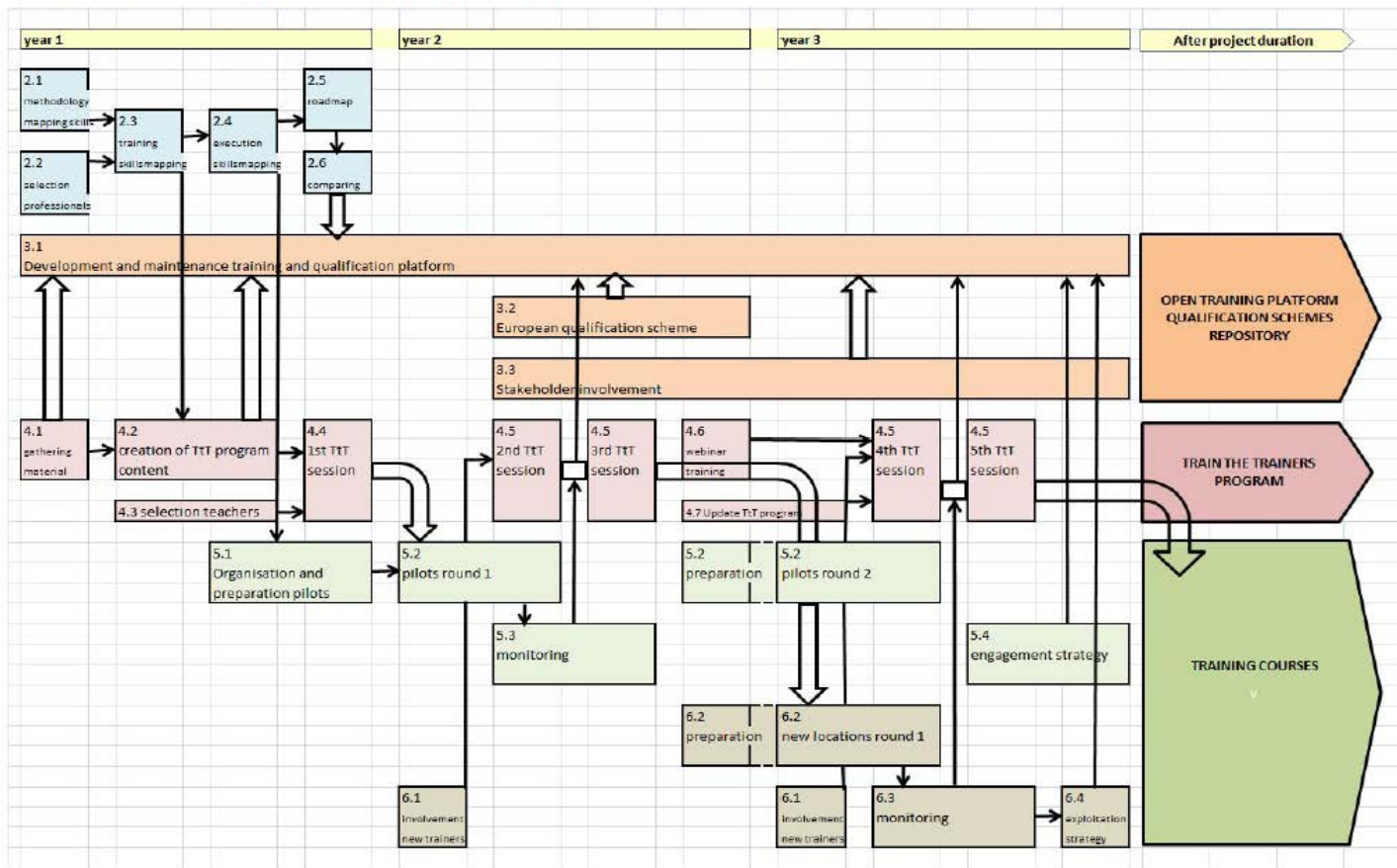
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# Korištenje i ponavljanje

- Proširenje utjecaja i poslovni plan za nastavak nakon završetka projekta

3.1.3 Graphical presentation of the inter-relation of tasks

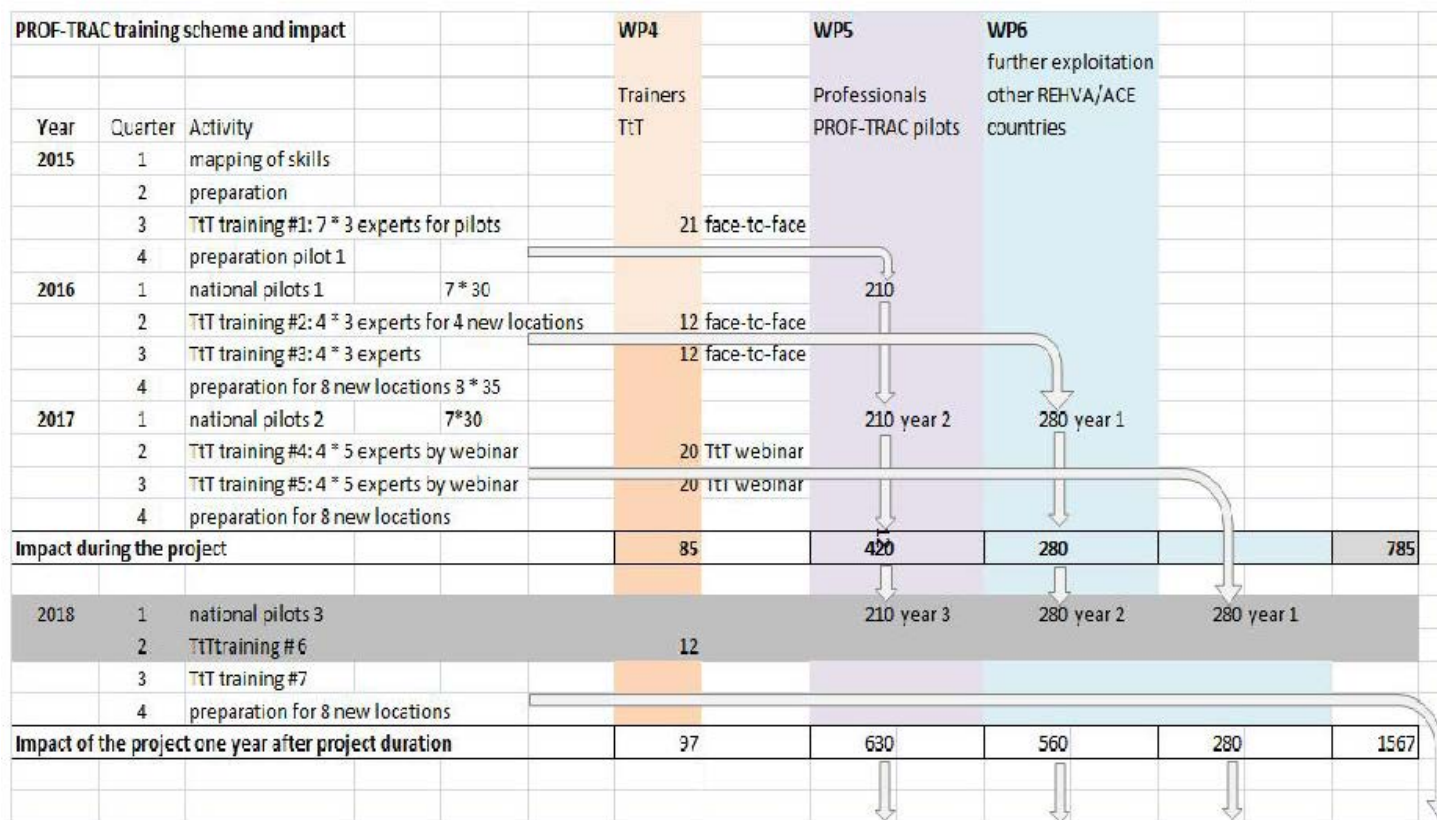




Tijekom trajanja PROF/TRAC biti će provedena obuka i povećanje znanja i kompetencija sljedećih profesionalaca:

- 85 predavača će biti obučeni na centralnim obukama i predstavljati „ambasadore” projekta
- 700 stručnjaka, (po 60 iz svake od 7 zemalja sudionica i 280 iz drugih država) će biti obučeno u pilot obukama koje će se provesti na nacionalnoj razini

U prvoj godini nakon završetka projekta planira se obuka daljnjih 770 stručnjaka (bez uračunatog broja onih koji će prisustvovati webinarima koji se također planiraju).



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# Neki od završenih EU projekata na kojima će se temeljiti obuka – ne kreira se novi nastavni materijal

	PROJECT	TARGET GROUP	BUILDING Phase
New Buildings	EDUCATE	Architectural education (only students)	IED Design phase
	MaTriD	Client – architect – engineer	IED Design phase
	ZEB	(Client) - Architect – engineer	IED Design phase
	IEE INTEND	Investor/Client – architect – engineer	IED Design phase
	IDES-EDU	Students and professionals from building sector (constructors, real estate developers, architects, suppliers, consultants) and accrediting bodies.	From project team to project realization
Residential buildings	TRAINREBUILD	Renovation Property owners, owner associations and local authorities	The focus is set on decision-making process before actual renovation to start From unaware owner to clear project definition (by owner), including financial schemas
Social Housing	SHELTER	Renovation of social housing	Coordination, cooperation and decision-making. Role of local authorities.
	POWERHOUSE	Social housing practitioners – full spectrum of users	Full spectrum. From project idea, to realization and maintenance
	AFTERPROJECT	Social Housing Client-architect-engineer in the end phase	The project aimed to enable SH organizations to improve the energy efficiency of their housing stock with cost optimal solutions.



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**Jedan od zanimljivijih dovršenih projekata je IDES-EDU.**

**Po programu razvijenom u okviru IDES-EDU provoditi će se i tečajevi PROF/TRAC**



IDES-EDU (Integral Sustainable Energy Design) projekt koji je proveden s namjerom edukacije i obuke studenata i profesionalaca s namjerom njihove specijalizacije u polju multidisciplinarnog projektiranja zgrada.

To je provedeno kroz više različitih koraka:

- Priprema nastavnog plana i programa treninga (preddiplomski i poslijediplomski tečajevi) koji naglašavaju značaj zahtjeva za održivošću u kreiranju prostora građevina, uključivo nove metode učenja koje osposobljavaju studente i profesionalce za rad u okvirima multidisciplinarnosti i međusobne ovisnosti u rješavanju problema.
- Suradnja između studenata i profesionalaca uključenih u tečajeve, u cilju razmjene iskustava i uspostave zajedničkog pristupa i razumijevanja.
- Certifikacija i akreditacija tečajeva na nacionalnim razinama kao okvira za europsku certifikaciju sudionika, ali i zgrada projektiranih u multidisciplinarnim timovima.
- Inteligentno koncipiran dinamički i prilagodljivi nastavni portal koji će obrazovne materijale približiti europskim studentima i profesionalcima.
- Povećana svijest u Europi, unaprjeđenje primjene i posvećenost integralnom održivom projektiranju zgrada kroz promidžbene kampanje u graditeljstvu, kao i kroz razmjenu programa među sveučilištima.
- U IDES-EDU je sudjelovalo 15 obrazovnih institucija iz Europe razvijajući nastavne planove i za studente diplomskih studija i profesionalce.



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IDES-EDU sadrži više obrazovnih paketa.

Svaki od paketa sadrži predavanja izrađena od strane profesora više europskih sveučilišta, specijalista za određena područja

### Architectural quality

AQ1 Architectural quality and energy efficiency	76.718 KB
AQ2 Appreciating the context	78.533 KB
AQ3 Architecture and people	15.254 KB
AQ4 Landscape and site resources	19.389 KB
AQ5 Resource efficient building morphologies and typologies	3.477 KB
AQ6 How buildings learn	31.512 KB

### Cross disciplinary team work

Workshop 1 - Single family building	
Workshop 2 - Commercial office building	
Workshop 3 - Urban planning	
Workshop 4 - Revitalisation	
1 - Lecture 1 - Introduction	745 KB
2 - Lecture 2 - Teamwork - Investor Architect	9.320 KB
3 - Lecture 3 - Teamwork - Structural HVAC	1.137 KB
4 - Lecture 4 - Teamwork - Principles	636 KB
5 - Workshop 1 - Single family building (Peter Op ...	1.251 KB
5 - Workshop 1 - Single family building	1.247 KB
6 - Workshop 2 - Commercial office building	970 KB
7 - Workshop 3 - Urban planning	1.261 KB
8 - Workshop 4 - Revitalisation	980 KB
9 - Lecture 5 - Teamwork - Summary	2.996 KB
Description of Cross-disciplinary teamwork	31 KB

Architectural Quality
Cross-disciplinary teamwork
Energy Production
EPBD
Heating_Cooling
Indoor_environment
Integrated_design_approach
Lighting
Market and Exploitation
Outdoor_environment
Sustainable Building
Ventilation
WBREC
IDES-EDU_D2.2_Course Instruction Guide



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## Energy production

 EP_intro_description_final	65 KB
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 EP_lecture 1_final	13.488 KB
 EP_lecture 2_final	20.980 KB
 EP_lecture 3_final	18.858 KB
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 EP_lecture 5_final	2.457 KB
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 EP_lecture 7_final	1.912 KB
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 EP_lecture 11_final	5.703 KB
 EP_lecture 12_final	3.055 KB








## Indoor Environment

 IDES-EDU_IEQ_lecture 1	4.542 KB
 IDES-EDU_IEQ_lecture 2	4.265 KB
 IDES-EDU_IEQ_lecture 3	9.394 KB
 IDES-EDU_IEQ_lecture 4	13.205 KB
 IDES-EDU_IEQ_lecture 5	14.110 KB
 IDES-EDU_IEQ_lecture 6	3.453 KB
 IDES-EDU_IEQ_lecture_7	3.916 KB
 IDES-EDU_IEQ_Seminar	755 KB
 IEQ copyright_comments	15 KB
 IEQ_course description	35 KB
 IEQ_Intro	210 KB
 Overview of IEQ	36 KB

## EPBD

 IDES-EDU_EPBD Lecture 1	1.289 KB
 IDES-EDU_EPBD Lecture 2	2.081 KB
 IDES-EDU_EPBD lecture 3	883 KB
 IDES-EDU_EPBD Lecture 4	2.286 KB
 IDES-EDU_EPBD Lecture 5	296 KB
 IDES-EDU_EPBD Lecture 6	1.030 KB
 IDES-EDU_EPBD Lecture_2	2.081 KB
 IDES-EDU_EPBD_Lecture_2	2.081 KB
 IDES-EDU_EPBD_Lecture_6	1.030 KB
 WP2_Fundamental packages_EPBD	40 KB

## Heating - Cooling

 Heating&Cooling_Intro	211 KB
 HEATING-COOLING_course description	37 KB
 IDES-EDU_Heating&Cooling_EP_overview	217 KB
 IDES-EDU_HeatCool-Lecture 1	18.283 KB
 IDES-EDU_HeatCool-Lecture 2_3	33.065 KB
 IDES-EDU_HeatCool-Lecture 4_5	15.100 KB
 IDES-EDU_HeatCool-Lecture 6_7	4.974 KB
 IDES-EDU_HeatCool-Lecture 8_9	20.178 KB
 IDES-EDU_HeatCool-Lecture 10	3.355 KB
 IDES-EDU_HeatCool-Lecture 11	6.400 KB
 IDES-EDU_HeatCool-Seminar 1_2	396 KB
 IDES-EDU_HeatCool-Seminar 3_4	1.056 KB
 IDES-EDU_HeatCool-Seminar 5_6	803 KB



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## Integrated design approach IDA

 IDA Workshop 1-3	
 IDA Workshop 4	
 Literature	
 Copyright issues in Integrated Design Ap...	18 KB
 Description of EP IDA	39 KB
 IDA Lecture 1	1.045 KB
 IDA Lecture 2	11.622 KB
 IDA Lecture 3	6.006 KB
 IDA Lecture 4	12.276 KB
 IDA Lecture 5	809 KB
 IDA Lecture 6	3.961 KB



















## Outdoor environment

 OE_intro_description-Rev3	76 KB
 OE_intro_Short-description-Rev3	51 KB
 OE-Exercise_Rev0	602 KB
 OE-Exercise-Solution-Rev2	370 KB
 OE-lecture1_OK_CopyR	3.812 KB
 OE-lecture2_OK_CopyR	7.451 KB
 OE-lecture3_OK_CopyR	2.586 KB
 OE-lecture4_OK_CopyR	3.582 KB
 OE-lecture5_OK_CopyR	6.584 KB
 OE-lecture6_OK_CopyR	1.764 KB
 OE-lecture7_OK_CopyR	11.688 KB
 OE-lecture8_OK_CopyR	18.277 KB

## Market and exploitation

 IDES-EDU_Exploitation an organisation-Lecture1	2.424 KB
 IDES-EDU_Exploitation an organisation-Lecture2	940 KB
 IDES-EDU_Exploitation an organisation-Lecture3	706 KB
 IDES-EDU_Organisation and exploitation of a RES	4.159 KB
 Organisation and exploitation of a RES	4.157 KB
 WP2_EP_F_Market and exploitation_3	37 KB

## Lighting

 Course plan	
 Exercises	
 Lecture 1ab_Introduction_Certifications_FINAL COPY RIGHT CHECKED	
 Lecture 7a_Daylight design strategies_Visual protection_FINAL COPY RIGHT CHECKED	
 Lecture1ab_Introduction_Certifications_FINAL COPY RIGHT CHECKED	
 Lecture2ab_Perception and visual effects of light_FINAL COPY RIGHT CHECKED	
 Lecture2c_Non visual effects of light_FINAL COPY RIGHT CHECKED	
 Lecture3a_Photometry_FINAL COPY RIGHT CHECKED	
 Lecture3b_Colour_FINAL COPY RIGHT CHECKED	
 Lecture4a_Electric light sources_FINAL COPY RIGHT CHECKED	
 Lecture4b_Luminaire and light fixtures_FINAL COPY RIGHT CHECKED	
 Lecture5a_Fundamentals of daylight_FINAL COPY RIGHT CHECKED	
 Lecture5b_Daylight design strategies_site orientation plan depth_FINAL COPY RIGHT CHECK...	
 Lecture6ab_Daylight design strategies_windows_FINAL COPY RIGHT CHECKED	
 Lecture7a_Daylight design strategies_Visual protection_FINAL COPY RIGHT CHECKED	
 Lecture8a_Measuring tools_FINAL COPY RIGHT CHECKED	
 Lecture9ab_Daylight simulation tools_FINAL COPY RIGHT CHECKED	
 Lecture10a_Commissioning and ControlSystems_FINAL COPY RIGHT CHECKED	



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## Sustainable building

 130625 Architectural strategies for energy-efficient building (AW)	27.858 KB
 SB1 Sustainable building	2.263 KB
 SB2 Resource Efficiency	9.365 KB
 SB3 Climate Change Mitigation and Adaptation (Peter Op t Veld's conflicted copy 2013-10-28)	6.128 KB
 SB3 Climate Change Mitigation and Adaptation	6.128 KB
 SB4 Sustainable Building Rating Tools	6.444 KB
 SB5 The neighbourhood scale	4.314 KB
 SB6 Life Cycle Management	13.817 KB
 SB7 Quality Control and Commissioning	1.125 KB

## Ventilation

 Ventilation_intro_description	99 KB
 Ventilation_Lecture 1	4.124 KB
 Ventilation_Lecture 2	12.178 KB
 Ventilation_Lecture 3	5.191 KB
 Ventilation_Lecture 4	4.558 KB
 Ventilation_Lecture 5	22.018 KB
 Ventilation_Lecture 6	9.238 KB
 Ventilation_Lecture 7	1.639 KB
 Ventilation_Lecture 8	2.733 KB
 Ventilation_Lecture 9	5.062 KB
 Ventilation_Lecture 10	15.552 KB
 VENT-Intro	180 KB

## WBREC – Whole building renewable energy concept

 IDES-EDU WBREC Lecture 1	24.569 KB
 IDES-EDU WBREC Lecture 2	19.097 KB
 IDES-EDU WBREC Lecture 3	21.814 KB
 IDES-EDU WBREC Lecture 3_	21.779 KB
 IDES-EDU WBREC Lecture 4	19.074 KB
 IDES-EDU WBREC Lecture 5	34.101 KB
 IDES-EDU WBREC Lecture 6	9.494 KB
 IDES-EDU WBREC Lecture 7	56.065 KB
 Structure SB and WBREC	86 KB
 WBREC Description	46 KB

Posebno su zanimljivi paketi koji govore o timskom radu među strukama, integralnom dizajnu (IDA) i konceptu zgrade temeljenom na OIE (WBREC).



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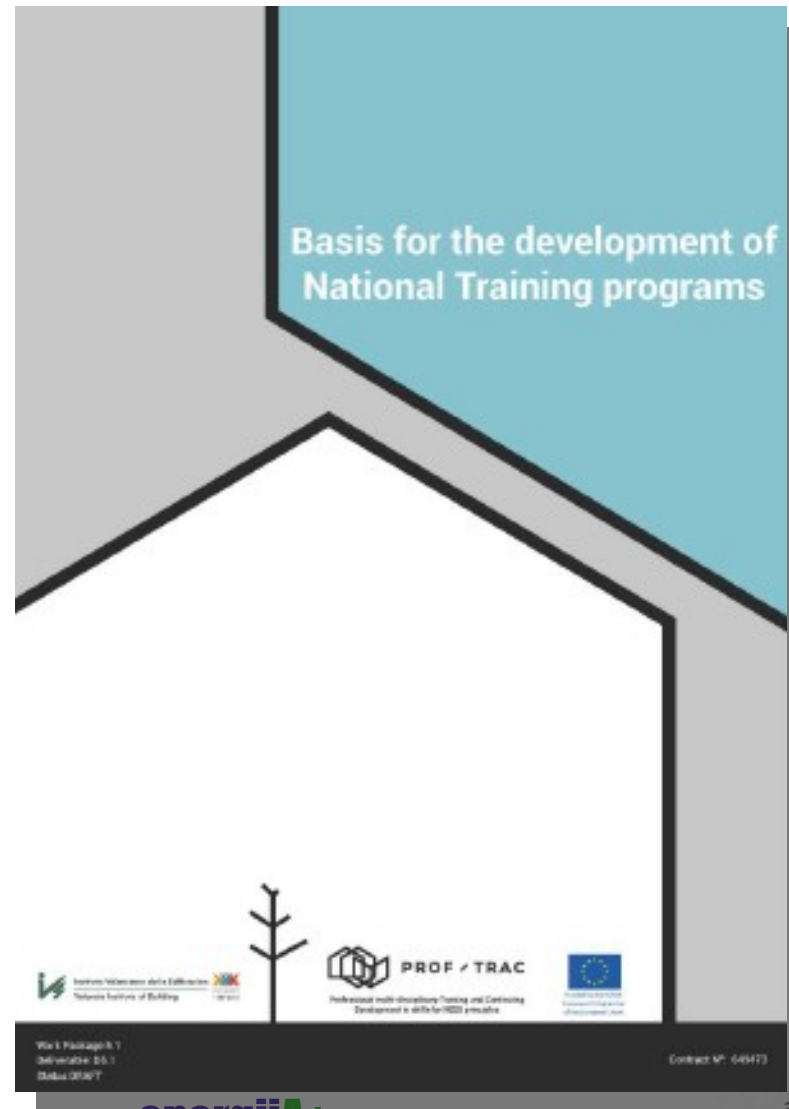
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# PROF/TRAC vodič: Temelj za razvoj nacionalnih programa obuke

- Vodič: Basis for the development of National training programs razvio je institut za građevinarstvo iz Valencije
- Namijenjen je organizatorima obuka na nacionalnoj razini kao podrška za provedbu pilot obuka



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Hrvatska komora inženjera strojarstva  
Croatian chamber of mechanical engineers

**Prva pilot obuka za  
INTERDISCIPLINARNI PRISTUP I TIMSKI RAD RAZLIČITIH STRUKA NA  
PROJEKTIRANJU ZGRADA GOTOVO NULTE ENERGIJE  
ZAGREB 14 – 16. SRPANJ 2016.**

**Branimir Pavković, Tomislav Tkalčić, Silvio Novak**



**Interdisciplinary approach and cross disciplinary team work for nZEB design**



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**Budva, Crna Gora, 22-23.09.2016.**

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## TARGET GROUP:

Architects, engineers (mechanical, electrical), building owners (managers)

## NUMBER OF PARTICIPANTS:

Approximately 30

## VENUE:

HKIS headquarters in Zagreb or one of Croatian Universities

## DATE:

July, 14.-16. 2016.

## INTERDISCIPLINARY APPROACH

Implemented, extends to be discussed and tuned up



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## OBJECTIVE(S):

EPBD: the basic knowledge of the energy related EU directives related to nZEB  
the knowledge of national regulations and calculations - application to nZEB

nZEB design issues – inserted after SWOT, to be discussed

WBREC: Developing ability to take part in a professional and interdisciplinary collaboration on design of whole building and renewable energy concepts. Developing ability to handle complex and research-oriented cases related to development of nZEB

IDA: Understanding the principals of how designers work and think, understanding the theoretical principal of different design approaches, understanding the procedure and having knowledge about the integrated way of thinking, understanding the principal of developing integrated design concepts

CDTW: Identifying the ways in which the teamwork problem shapes the design process and having ability to integrate basic issues into the teamwork design process, understanding cross-disciplinary networks in design process, understanding different approaches and working attitudes of designers, while maintaining one single set of final aims, understanding the principle of developing “a common” language for the design team.

Workshop: developing mutual understanding of nZEB principles within the working group on a practical example

Discussion and brainstorming : comparison, discussion and evaluation of produced results, conclusions on skill gaps



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## CONTENTS:

All training materials prepared according to IDES-EDU programme. Preliminary materials available as e-learning materials.

### Whole Building and Renewable Energy Concepts

- **Lecture 1: Whole Building and Energy Solutions**
  - Introduction to the educational package including definition of future challenges to the building sector in relation to design and operation of very low energy buildings.
- **Lecture 2: Design Strategies for Reduction of Energy Demand**
  - Design considerations and application of a design strategy.
- **Lecture 3: Design Strategies for Utilization of Climatic Principles**
  - Description of climatic design principles and strategies for utilization of passive energy technologies.
- **Lecture 4: Energy Use Control and Occupant Impact**
  - Occupant behavior and practices and their influence on building energy performance and indoor environment.
- **Lecture 5: Building Integrated Renewable Energy**
  - Examples and development stage of renewable energy solutions for buildings.
- **Lecture 6: Whole Building Design and Simulation Tools**
  - Building simulation and its role in the design process.
- **Lecture 7: Built Examples**
  - Description of a number of built examples worldwide to illustrate the building concepts and design strategies.
  
- **Seminar 1:** The aim of this seminar is to identify the factors related to climate, building layout and façade design that may have any influence to final energy performance
- **Seminar 2:** The aim of this seminar is to create a total energy concept of the building from the previous seminar to reach a net zero energy performance.



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### Integrated Design Approach

- **Lecture 1: Introduction to Integrated Design Approaches**
  - Introduction to the overall concept of integrated design process (IDP) by lecture and video from
- **Lecture 2-3: Integrated Design Approaches in detail**
  - A selection of three methods of integrated design approaches is presented in detail
- **Lecture 4: Model for an Integrated Analysis of a Very Low Energy Buildings Life Cycle**
  - Very low energy buildings knowledge management models, theories and strategies are introduced.
- **Lecture 5: Introduction to design thinking vs. empirical analytical thinking (1)**
  - How designers (architects) work in practices and how that is different from empirical analytical thinking (positivistic thinking, engineering).
- **Lecture 6: Introduction to design thinking vs. empirical analytical thinking (2)**
  - Introduction to design thinking.
  
- **Workshops 1, 2, 3: Integrated Design Approaches in practise.**
  - The three workshops can take place parallel with the lectures and the module of cross-disciplinary teamwork. The workshops are performed in groups (containing different disciplines) where the students discuss different cases of existing buildings.



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## Understanding of the EPBD



- **Lecture 1: Climate targets, EU energy policy**
  - Global warming, CO<sub>2</sub> emission, general introduction
- **Lecture 2: EPBD – 91/2002/EC**
  - An integrated methodology to rate the energy performance of buildings
  - Minimum energy performance standards for new and existing buildings that undergo major renovation
  - Energy certificates for buildings
  - Regular inspections of boilers and air-conditioning systems
- **Lecture 3: Calculation of the energy performance of buildings**
  - ISO EN 13790 Energy performance of buildings – Calculation of energy use for space heating and cooling National calculation method
- **Lecture 4: Energy certification of buildings**
  - EN 15217 Energy performance of buildings – Methods for expressing energy performance and for energy certification of buildings  
(EN 15217 Energy performance of buildings – Overall energy use and definition of energy ratings)
- **Lecture 5: Inspection of heating and AC systems**
  - EN 15239 Ventilation for buildings – Energy performance of buildings – Guidelines for inspection of ventilation systems
  - EN 15240 Ventilation for buildings – Energy performance of buildings – Guidelines for inspection of air-conditioning systems
  - EN 15378 Heating systems in buildings – Inspection of boilers and heating systems
- **Lecture 6: EPBD recast – 2010/31/EU**
  - Cost-optimal minimum energy performance requirements



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## Cross-disciplinary teamwork



- **Lecture 1: Introduction to cross-disciplinary Teamwork – Main cross-disciplinary issues**
  - Introduction to the main cross-disciplinary issues, mono-disciplinary, multi-disciplinary, inter-disciplinary, trans-disciplinary, cross-disciplinary, teamwork, common language, actors of the building process, investor, architect, developer, designers, users, decision-making process, hybrid organisations.
- **Lecture 2: Case Study Presentation**
  - The basic Architects and Developers expectations.
- **Lecture 3: Case Study Presentation**
  - Basic structural engineers and HVAC engineers expectations, structural engineers and HVAC engineers values and goals, structural engineers and HVAC engineer's needs, structural engineers and HVAC engineers expectations, structural engineers and HVAC engineers point of view, structural and HVAC technical aspects, structural engineers and HVAC engineers language.
- **Lecture 4: Cross-disciplinary networks – Teamwork**
  - Basics of teamwork, communication, information exchange, cross-disciplinary networks, team building, goal statement, social contract, roles, interaction, interpersonal and inter teams relations, coordination meetings.
- **Workshops & Follow-up discussion – Principles**
  - Principal participants are: Investor, Developer, Architect, Structural Engineer, HVAC Mechanical Engineer and User. Additional participants could be: Energy Consultant, Electrical Engineer, Fire Protection Manager, Construction Manager, Construction Supervisor, Facility Manager
  - One of the disciplines will be then appointed as a leader to solve the case for all disciplines.
  - Students will be given a suggestion of plan and description of the aims which should be fulfilled by the final product.
  - Since each of the students will present a different professional discipline, the approach to the final solution will be different.
  - As a team – students will have to reach one final solution.
  - Teacher should be available during the workshop to act as a mediator and negotiator between each profession represented.
- **Lecture 5: Summary of the Workshops & Follow-up discussion**
  - Summarising the issues presented on the Workshops. The various cross-disciplinary networks are presented in detail. That lecture will share experiences from existing cases and final reports showing different perspectives of understanding teamwork. Lecture will include following aspects: urban planning, architectural, technical, economics, sustainability & ecology, construction.



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## Face – to – face training (lectures) 2 x 6 = 12 h

EPBD – Energy performance of Buildings: demands, approach, definitions related to nZEB

nZEB design issues – suitable volume and level

WBREC - Whole building and renewable energy concepts as design solutions where the building and its building construction elements together with building services and renewable energy systems are integrated into one system in order to reach an optimal environmental performance in terms of energy performance, resource consumption, ecological loadings and indoor environmental quality

IDA – integrated design approach

Cross disciplinary team work - CDTW

practical and theoretical understanding that each design process with the complex network of different designers requires creation of a certain “language”. In the sustainable design process each of the disciplines depends on each other – simultaneously and in cross-reference.

SELF LEARNING: within the course or before, during preparation?



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## WORKSHOP 16 h

Six groups (5 participants each) containing representatives of all professions will be formed in order to define a preliminary design of a nZEB, based on earlier prepared templates and materials as a basis for work. Architects, engineers will be required to produce preliminary program and basic design in mutual coordination, and input from building managers will be expected as well. The attendees of one profession could teach the other attendees on the specific topic where the gap was found.

Discussion: discussion on workshop outcomes will be discussed within groups. Competitive approach.

### OUTCOMES EXPECTED:

Assuming basic concepts of team work on nZEB.

Exchange of experience.

Mutual understanding and awareness of of cross disciplinary team work on nZEB designs

Increased skills in nZEB design

### TRAINING METHODS:

Preliminary preparation of attendees based on e-learning course materials prepared in advance by training provider.

Face – to face lectures.

Workshop with solving practical examples based on existing case studies. Discussion and brainstorming.



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## READING

REQUIRED: IDES EDU based materials prepared in advance by training provider

RECOMENDED: Materials from PROF/TRAC training material repository

## FEEDBACK FROM SWOT SESSION

After the discussion during the SWOT analysis session we are considering implementation of nZEB design principles into the the first part of lectures, after EPBD, slight decrease of the volume of other topics in order to maintain approximately the same number of hours for the entire course, and implement design issues into the reading materials for self education.



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# Organizacija seminara Pilot 1 Zagreb, 14-16. srpanj 2016.



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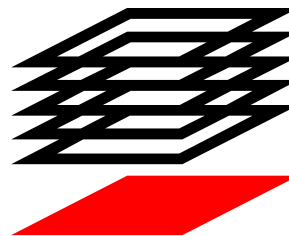
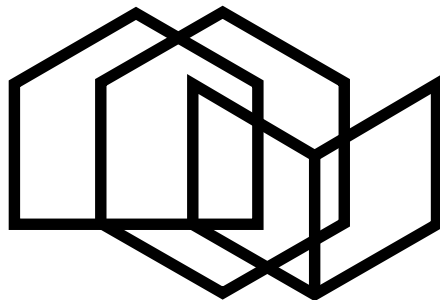
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Prva pilot obuka za  
**INTERDISCIPLINARNI PRISTUP I TIMSKI RAD RAZLIČITIH STRUKA NA  
PROJEKTIRANJU ZGRADA GOTOVO NULTE ENERGIJE**  
u okviru projekta



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Multidisciplinarna izobrazba i trajno stručno usavršavanje profesionalaca u vještinama za zgrade gotovo nulte energije

Professional multi-disciplinary Training and Continuing Development in skills for nZEB principles



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Dan	Sat	Tema	Predavač
14. 07. 2016.	15.00 – 16.30	Uvod o PROJEKTU prof/trac, ciljevima i strukturi seminara, pravni okvir EPBD, implementacija u EU, definicija i značenje nZEB	BP
	16.45 – 18.15	Strategije projektiranja, koncept cjelokupne zgrade baziran na OIE	TT
	18.30 – 20.00	Interdisciplinarni rad na nZEB	BP
15. 07. 2016.	09.00 – 10.30	Arhitektonska kvaliteta - Morfologija zgrade - Tehnička rješenja za nZEB (arhitektonsko građevinska)	SN
	10.45 – 12.15	Tehnička rješenja za nZEB (instalacije strojarke i elektro) 90'	TT
	12.30 – 14.00	Simulacijski modeli – dinamički TRNSYS stacionarni KiExpert – usporedba mogućnosti i rezultata	BP
	14.00 – 15.00	Ručak	
	15.00 – 16.30	Radionica: Opis ciljeva radionice i postupka kod izrade idejnih rješenja Proračun potrošnje postojeće stanje KiExpert	SN
	16.45 – 18.15	Radionica: Predlaganje usklađenih rješenja integralne koncepcije, izmjene i proračuni	SN, BP, TT
	18.30 – 20.00	Radionica: Analiza i usklađivanje prvog arhitektonskog koncepta, diskusija, prijedlozi izmjena	SN, BP, TT
16. 07. 2016.	09.00 – 10.30	Radionica: Provedba proračuna za drugu iteraciju, ocjena potrošnje energije (QHnd, Eprim), izračun ERES	SN, BP, TT
	10.45 – 12.15	Izrada elaborata idejnog tehničkog rješenja, opis, rezultati proračuna,	SN, BP, TT
	12.30 – 14.00	Radionica: SWOT analiza, po grupama izrada rezultata SWOT analize	SN, BP, TT
	14.00 – 15.00	Ručak	
	15.00 – 16.30	Radionica: Prezentacija rezultata SWOT analize i diskusija među grupama	SN, BP, TT
	16.45 – 18.15	Radionica: Izrada završnih rješenja, glasanje o najboljem radu, diskusija o metodologiji pilot seminara, prijedlozi i sugestije za buduće radionice	SN, BP, TT
	18.30 – 19.15	ispunjavanje upitnika za ocjenu, dodjela uvjerenja o pilotu	



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# Pilot obuka

## Zagreb, 14.-16.07.2016.



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# Obrazac za ocjenu seminara



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## ANNEX 1. QUESTIONNAIRE QUALITY, FIELDS OF INTEREST

The training activity you have just attended has benefited from funding by the Horizon 2020 programme for ProfTrac project

We hope you have been satisfied with the quality of the training provided and would be very grateful if you would take of your time and fill in the attached Evaluation Questionnaire.

We suggest beneficiaries to collect participants' questionnaires at the end of the training activity and send all of them along with the final report.

### YOUR OPINION IS RELEVANT TO US

It will provide us with valuable data, which we can help us provide and maintain a high-quality service, especially:

- Adapt the training activities on offer to the specific needs of European professionals
- Evaluate the impact of the training activities

Your comments and suggestions are a very important tool for us to develop new formulas of continuous training in the context of a construction industry.

### CONFIDENTIALITY

We understand that you may have concerns about providing your personal information. We would like to assure you that your personal information is kept strictly confidential and is not used outside of the ProfTrac project under any condition. This information will be used only for survey quality control by the ProfTrac project for evaluation purposes.

Thank you for your cooperation!



## PROF-TRAC TRAINING - EVALUATION QUESTIONNAIRE

### BASIC INFORMATION

Name and Surname:

Nationality:

Company (if any):

Position:

City and country of residence:

Tel/Fax:

E-mail:

Age:

### BACKGROUND

HOW DID YOU FIND OUT ABOUT THIS TRAINING COURSE?

Word of mouth

Mailing

Ad in trades/newspapers

Meeting with the training organisers

Other, please state source: .....

HAVE YOU ATTENDED THE TRAINING WITH A PROJECT TO BE DEVELOPED? |

Yes Topic of your project (if applicable): .....

No

### EVALUATION OF THE TRAINING:

OVERALL RATING OF THE TRAINING COURSE:

Excellent

Good

Satisfactory

Unsatisfactory

Comments (optional): .....

YOUR MOTIVATION FOR ATTENDING THIS TRAINING COURSE: (PLEASE TICK SEVERAL ANSWERS IF APPROPRIATE):

Development of knowledge and skills

Development of a specific project

Building a network of contacts

Improving your company's performance

Finding a new job

Other, please specify: .....





HOW WELL WERE YOUR OBJECTIVES MET?

Completely Not at all  Well  Partly  Not very well

TRAINING CONTENT

RELEVANCE TO YOUR PRESENT JOB

Very relevant  Relevant  Of little relevance

RELEVANCE TO GENERAL CAREER DEVELOPMENT

Very relevant  Relevant  Of little relevance

CONTENT COVERED

Too much  About right  Too little

LEVEL OF CONTENT

Too advanced  About right  Too elementary

LEVEL OF OTHER PARTICIPANTS

Too advanced  About right  Too elementary

LENGTH OF EVENT

Too long  About right  Too short

WHAT DID YOU THINK OF THE TRAINERS/TUTORS? IN PARTICULAR, HOW DID YOU RATE THE TRAINERS/TUTORS?

KNOWLEDGE OF THE SUBJECT

Excellent  Good  Satisfactory  Unsatisfactory

COMMUNICATION SKILLS

Excellent  Good  Satisfactory  Unsatisfactory

RELATIONSHIP WITH THE GROUP

Excellent  Good  Satisfactory  Unsatisfactory

WILLINGNESS TO HELP AND SUPPORT PARTICIPANTS

Excellent  Good  Satisfactory  Unsatisfactory

COMMENTS (OPTIONAL)

.....

WHAT DID YOU THINK OF THE WAY IN WHICH THE TRAINING WAS DELIVERED? IN PARTICULAR, HOW DID YOU RATE

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OVERALL ORGANISATION OF COURSE

Excellent  Good  Satisfactory  Unsatisfactory

AVAILABILITY OF TRAINING ORGANISERS

Excellent  Good  Satisfactory  Unsatisfactory

BALANCE OF GROUP AND INDIVIDUAL WORK

Excellent  Good  Satisfactory  Unsatisfactory

MIX OF THEORY AND PRACTICE

Excellent  Good  Satisfactory  Unsatisfactory

HANDOUTS AND COURSE DOCUMENTATION

Excellent  Good  Satisfactory  Unsatisfactory

TRAINING ROOM FACILITIES

Excellent  Good  Satisfactory  Unsatisfactory

FOLLOW-UP AND TUTORING (IF ANY)

Excellent  Good  Satisfactory  Unsatisfactory

COMPUTER FACILITIES (IF ANY)

Excellent  Good  Satisfactory  Unsatisfactory

MULTIMEDIA INSTALLATIONS (IF ANY)

Excellent  Good  Satisfactory  Unsatisfactory

TV AND VIDEO INSTALLATIONS (IF ANY)

Excellent  Good  Satisfactory  Unsatisfactory

TRANSLATION/INTERPRETATION (IF ANY)

Excellent  Good  Satisfactory  Unsatisfactory

PRODUCTION AND POST-PRODUCTION EQUIPMENT (IF ANY)

Excellent  Good  Satisfactory  Unsatisfactory

COMMENTS (OPTIONAL):

.....

WHICH ASPECTS OF THE TRAINING COURSE DO YOU THINK WERE/WILL BE MOST USEFUL TO YOU PERSONALLY?

COURSE CONTENT

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Very useful       Useful       not very useful  completely useless

**CONTACTS WITH TRAINERS**

Very useful       Useful       not very useful  completely useless

**CONTACTS WITH PARTICIPANTS**

Very useful       Useful       not very useful  completely useless

**FOLLOW-UP CONSULTANCY**

Very useful       Useful       not very useful  completely useless

**DID YOU RECEIVE ANY SCHOLARSHIP FOR ATTENDING THE COURSE?**

No.

Yes I received a scholarship from the Training Organisation to cover following costs:

Participation fees      Amount: € .....

Travel costs      Amount: € .....

Subsistence costs      Amount: € .....

Total      Amount: € .....

Yes I received a scholarship from another source (please, specify which one .....www) to cover following costs:

Participation fees      Amount: € .....

Travel costs      Amount: € .....

Subsistence costs      Amount: € .....

Total      Amount: € .....

**DO YOU PLAN TO ATTEND OTHER PFOF/ TRAC TRAINING ACTIVITIES IN THE FUTURE?**

Yes. Please specify which one.....

No.

**WOULD YOU RECOMMEND THIS TRAINING ACTIVITY/WORKSHOP TO OTHERS?**

Yes.

No.

**WHAT OTHER COMMENTS DO YOU HAVE ON ANY ASPECTS OF THIS COURSE?**

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# Uvjerenje o završenoj obuci



## ANNEX 3. TEMPLATE FOR THE CERTIFICATION

For participating in the trainings a sample Certificate of Attendance is provided: This sample is an illustration only, and the wording will reflect the course and dates. The fields marked in blue should be modified.


**PROF / TRAC**
*(logo of the organisation)*

This is to certify that

*(Name Surname)*

Attended a course organised by

*(Organisation)*

In the framework of

*PROF/TRAC project*

On


*(Specialty trained)*

During the period

*(day Month – day Month year)*

*(Stamp of the entity and signature of the responsible)*

*(Position of the person signing)*



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# Zgrade gotovo nulte energije



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# Europski zakonodavni okvir

→ *Tri direktive kao paket mjera koje definiraju uvjete za značajno dugoročno poboljšanje energetske svojstva Europskog stambenog fonda*



- značajno pooštreno u proteklih nekoliko godina:
  - preinaka Direktive o Energetskoj učinkovitosti zgrada (Energy Performance of Buildings) (EPBD, 2010/31/EU),
  - Direktiva o energetske učinkovitosti (EED, 2012/27/EU),
  - te u manjoj mjeri, Direktiva o obnovljivim izvorima energije (RED, 2009/28/EC).
- Države članice moraju izraditi nacionalne planove za povećanje broja zgrada gotovo nulte energije. Planovi uključuju:
  - Definiciju G0EZ sukladno nacionalnim/lokalnim uvjetima (u kWh/m<sup>2</sup>)
  - Ciljevi za nove zgrade od 2015.
  - Informacije, financijske ili druge mjere usvojene za promidžbu G0EZ + detalji o korištenju obnovljive energije u novim i postojećim zgradama (veća rekonstrukcija)
  - Od 31.12.2020. sve nove zgrade trebaju biti G0EZ, a javne nakon 31.12.2018.



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# Tehnički propis o racionalnoj uporabi energije i toplinskoj zaštiti u zgradama (NN128/2015)

(ispunjeno izmjenama i dopunama NN 130/14)

Zgrada gotovo nulte energije jest zgrada koja ima vrlo visoka energetska svojstva. Ta gotovo nulta odnosno vrlo niska količina energije trebala bi se u vrlo značajnoj mjeri pokrivati energijom iz obnovljivih izvora, uključujući energiju iz obnovljivih izvora koja se proizvodi na zgradi ili u njezinoj blizini, a za koju su zahtjevi utvrđeni ovim propisom. Od 31. prosinca 2020. sve nove zgrade moraju biti »zgrade gotovo nulte energije«; a nakon 31. prosinca 2018. nove zgrade koje kao vlasnici koriste tijela javne vlasti moraju biti »zgrade gotovo nulte energije«.

Tablica 8. Najveće dopuštene vrijednosti za nove zgrade i zgrade gotovo nulte energije zgrade grijane i/ili hladene na temperaturu 18 °C ili više

ZAHTJEVI ZA NOVE ZGRADE i G0EZ	$Q''_{II,nd}$ [kWh/(m <sup>2</sup> ·a)]						$E_{prim}$ [kWh/(m <sup>2</sup> ·a)]				$E_{del}$ [kWh/(m <sup>2</sup> ·a)]	
	NOVA ZGRADA i G0EZ						NOVA		G0EZ		NOVA	
	kontinent, $\theta_{mm} \leq 3$ °C			primorje, $\theta_{mm} > 3$ °C			kont $\theta_{mm} \leq 3$ °C	prim $\theta_{mm} > 3$ °C	kont $\theta_{mm} \leq 3$ °C	prim $\theta_{mm} > 3$ °C	kont $\theta_{mm} \leq 3$ °C	prim $\theta_{mm} > 3$ °C
KATEGORIJA ZGRADE	$f_0 \leq 0,20$	$0,20 < f_0 < 1,05$	$f_0 \geq 1,05$	$f_0 \leq 0,20$	$0,20 < f_0 < 1,05$	$f_0 \geq 1,05$						
Višestambena	40,50	$32,39 + 40,58 \cdot f_0$	75,00	24,84	$19,86 + 24,89 \cdot f_0$	45,99	120	90	80	50	80	60
Obiteljska kuća	40,50	$32,39 + 40,58 \cdot f_0$	75,00	24,84	$17,16 + 38,42 \cdot f_0$	57,50	115	70	45	35	80	50
Uredska	16,94	$8,82 + 40,58 \cdot f_0$	51,43	16,19	$11,21 + 24,89 \cdot f_0$	37,34	70	70	35	25	40	40
Obrazovna	11,98	$3,86 + 40,58 \cdot f_0$	46,48	9,95	$4,97 + 24,91 \cdot f_0$	31,13	65	60	55	55	60	60
Bolnica	18,72	$10,61 + 40,58 \cdot f_0$	53,21	46,44	$41,46 + 24,89 \cdot f_0$	67,60	300	300	250	250	220	220
Hotel i restoran	35,48	$27,37 + 40,58 \cdot f_0$	69,98	11,50	$6,52 + 24,89 \cdot f_0$	32,65	130	80	90	70	90	50
Sportska dvorana	96,39	$88,28 + 40,58 \cdot f_0$	130,89	37,64	$32,66 + 24,91 \cdot f_0$	58,82	400	170	210	150	290	110
Trgovina	48,91	$40,79 + 40,58 \cdot f_0$	83,40	13,90	$8,92 + 24,91 \cdot f_0$	35,08	450	280	170	150	290	170
Ostale nestambene	40,50	$32,39 + 40,58 \cdot f_0$	75,00	24,84	$19,86 + 24,89 \cdot f_0$	45,99	150	100	/	/	80	60



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Definicija zgrade gotovo nulte energije u RH primjenjuje se za nove zgrade prema sljedećim namjenama:

- višestambena
- obiteljska kuća
- uredska
- obrazovna
- bolnica
- hotel i restoran
- sportska dvorana
- trgovina
- ostale nestambene zgrade

Svojstva zgrada gotovo nulte energije određena su prema karakteristikama fonda utvrđenim za definiciju referentnih zgrada, uz optimizaciju geometrijskih karakteristika s ciljem postizanja što niže razine potrebne energije za zadovoljavanje energetske potreba zgrada.

Zgrada gotovo nulte energije definirana je potrošnjom primarne energije za grijanje, hlađenje, ventilaciju, pripremu potrošne tople vode i rasvjetu, te minimalnim udjelom obnovljivih izvora energije u zadovoljavanju energetske potreba zgrade.



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# BPIE nZEB definicije 2015 www.bpie.eu

Country	Status of the definition	Main reference(s)	Year of enforcement		nZEB definition for new buildings						nZEB definition for existing buildings				
					Public	Non-public	EPBD scope of nZEB definition [1]	Numerical indicator	Maximum primary energy [kWh/m <sup>2</sup> y]		Share of renewable energy	Other indicators	Status of the definition	Maximum primary energy [kWh/m <sup>2</sup> y]	
									Residential buildings	Non-residential buildings				Residential buildings	Non-residential buildings
Austria	✓	OIB Guidelines 6	1/01/2019	1/01/2021	✓ [7]	✓	160	170 (from 2021)	Minimum share proposed in the draft of OIB guidelines for all buildings	EP, CO <sub>2</sub>	✓	200	250 (from 2021)		
Belgium - Brussels	✓	Amended Decree of 21/12/2007	1/01/2015	1/01/2015	✓	✓	45	~90 [2]	✓ Qualitative	EP, OH	✓	54	~ 108 [2]		
Belgium - Flanders	✓	Regulation of 29/11/2013	1/01/2019	1/01/2021	✓	✓	30% PE [5]	40% PE [5]	✓ Quantitative [4]	EP, OH	Under development				
Belgium - Wallonia	Under development	Consolidated report to EC	1/01/2019	1/01/2019	✓	Under development			Quantitative	EP	Under development				
Bulgaria	Still to be approved	National nZEB Plan, BPIE study	1/01/2019	1/01/2021	✓	Still to be approved	~30-50	~40-60	Quantitative	EP	As for new buildings	~30-50	~40-60		
							Included in the calculation; building needs to comply with class A					Included in the calculation; building needs to comply with class A			
Croatia	✓	Regulation OG 97/14, National nZEB Plan	1/01/2019	1/01/2021	✓	✓	33-41[3]	Under development	Minimum share in current requirements for all buildings	EP	ND				
Cyprus	✓	Decree 366/2014, Law 210(I)/2012	1/01/2019	1/01/2021	✓	✓	100	125	✓ Quantitative	EP	✓ As for new buildings	100	125		
Czech Republic	✓	Regulation 78/2013 Coll.	2016-2018 depending on size	2018-2020 depending on size	✓	✓	75-80% [2,5]	90% [5]	✓ Quantitative	EP, TS	✓ As for new buildings	75-80% [2,5]	90% [5]		
Denmark	✓	Building Regulations 2010	1/01/2019	1/01/2021	✓	✓	20	25	✓ Qualitative	EP, OH, TS	✓ As for new buildings	20	25		
Estonia	✓	Regulation 68:2012	1/01/2019	1/01/2021	✓ [7]	✓	50-100 [2]	90-270 [2]	✓ Qualitative		✗				
Finland	Under development	Consolidated report to EC	1/01/2018	1/01/2021	✓ [7]	ND			ND		ND				
France	Definition of Positive Energy Buildings under development [8]	Thermal Regulation 2012, National nZEB Plan	28/10/2011	1/01/2013	✓	✓	40-65 [2,3]	70-110 [2,3]	✓ Quantitative [4]	EP, OH, TS	✓	80 [3]	60% PE [2]		
Germany	Under development	KfW Efficiency House, National nZEB plan	1/01/2019	1/01/2021	✓	Under development	40% PE [5]		Minimum share in current requirements for all buildings	EP	Under development	55% PE [5]			
Greece	Under development	Law 4122/2013	1/01/2019	1/01/2021	ND	ND			Minimum share in current requirements for all buildings		Under development				
Hungary	Under development	Amended decree 7/2006, study by University of Debrecen	1/01/2019	1/01/2021	✓	Under development	50-72 [2]	60-115 [2]	✓ Quantitative	EP	Under development				
Ireland	✓	Draft definition in National nZEB Plan	1/01/2019	1/01/2021	✓	✓	45	~60% PE [5]	✓ Quantitative [4]	CO <sub>2</sub>	Under development	75-150			

BPIE - The Buildings Performance Institute Europe [J. Kurnitski 2016]

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## Nacionalni plan povećanja broja zgrada gotovo nulte potrošnje energije

Hrvatska je kao članica Europske unije ispunila obvezu definiranja standarda zgrade koja je gotovo nula energetska. Ta je činjenica utvrđena u Bruxellesu na sastanku dionika na projektu CA EPBD (Usmjerena akcija za implementaciju Direktive o energetske svojstvima zgrada - Concerted Action Energy Performance of Buildings Directive).

Hrvatska je standarde projektiranja i gradnje stambenih i nestambenih zgrada približno nulte energije te rokove do kojih ih je potrebno primjenjivati propisala izmjenama i dopunama Tehničkog propisa o racionalnoj uporabi energije i toplinskoj zaštiti u zgradama (NN 130/14).

MINISTARSTVO GRADITELJSTVA I PROSTORNOGA UREĐENJA

### PLAN ZA POVEĆANJE BROJA ZGRADA GOTOVO NULTE ENERGIJE DO 2020. GODINE

prosinac 2014.



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- PROPISI
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- SLUŽBENI OBRASCI
- NAJČEŠĆA PITANJA I ODGOVORI
- UPUTE, OBJAŠNENJA I MIŠLJENJA

ENERGETSKA UČINKOVITOST ▶

## ENERGETSKA UČINKOVITOST



Ispiši stranicu



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ENERGETSKA UČINKOVITOST ▶ Strateški dokumenti i projekti ▶

## Strateški dokumenti i projekti

### Strategije

- [Dugoročna strategija za poticanje ulaganja u obnovu nacionalnog fonda zarada Republike Hrvatske](#)

[EN verzija](#)

### Planovi

- [Prvi Nacionalni akcijski plan energetske učinkovitosti Republike Hrvatske za razdoblje 2008.-2010.](#)
- [Drugi Nacionalni akcijski plan energetske učinkovitosti Republike Hrvatske za razdoblje do kraja 2013.](#)
- [Treći Nacionalni akcijski plan energetske učinkovitosti za razdoblje 2014.-2016.](#)
- [Nacionalni plan povećanja broja zgrada gotovo nulte potrošnje energije](#)

### Programi

- [Program energetske obnove obiteljskih kuća za razdoblje od 2014. do 2020. godine s detaljnim planom za razdoblje od 2014. do 2016. godine](#)
- [Program energetske obnove višestambenih zgrada za razdoblje od 2014. do 2020. godine s detaljnim planom za razdoblje od 2014. do 2016. godine](#)
- [Program energetske obnove zarada javnog sektora za razdoblje od 2014. do 2015. godine](#)
- [Program energetske obnove zgrada komercijalnih nestambenih zgrada za razdoblje od 2014. do 2020. godine](#)

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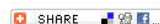


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## Detaljan prikaz

**EU PROJEKT PROF-TRAC (Professional multi-disciplinary Training and Continuing Development in skills for NZEB principles - Multidisciplinarna izobrazba i trajno stručno usavršavanje profesionalaca u vještinama za zgrade približno nulte energije)**

(04.05.2016)



Hrvatska komora inženjera strojarstva je partner u EU projektu iz okvirnog programa za istraživanje i inovacije Horizon 2020 za razdoblje 2014-2020, pod nazivom PROF-TRAC (Professional multi-disciplinary Training and Continuing Development in skills for NZEB principles - Multidisciplinarna izobrazba i trajno stručno usavršavanje profesionalaca u vještinama za zgrade približno nulte energije).

Provedba projekta počela je 2015 godine i sada je u drugoj od tri planirane godine trajanja projekta.

Uspješan proces projektiranja, gradnje i obnove zgrada na način da udovolje zahtjevu približno nulte energije zahtijeva integralni pristup projektiranju i rad u multidisciplinarnim timovima. PROF-TRAC osigurava rješenje za prevladavane zapreke za takav pristup kroz razvoj i održavanje platforme za obuku i kontinuirano usavršavanje profesionalaca uključenih u taj proces.

Planira se da se ciljevi projekta ostvare kroz:  
1. Mapiranje postojećih i potrebnih vještina svih profesionalaca koji se bave s NZEB.



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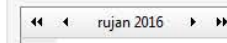


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