



SAMO1PLANET
CARE4CLIMATE



REPUBLIKA SLOVENIJA
**MINISTRSTVO ZA OKOLJE,
PODNEBJE IN ENERGIJO**

Towards deep and sustainable renovation of Slovenian building stock

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Building and Civil Engineering Institute ZRMK, Slovenia



Gradbeni inštitut ZRMK
Building and Civil Engineering Institute

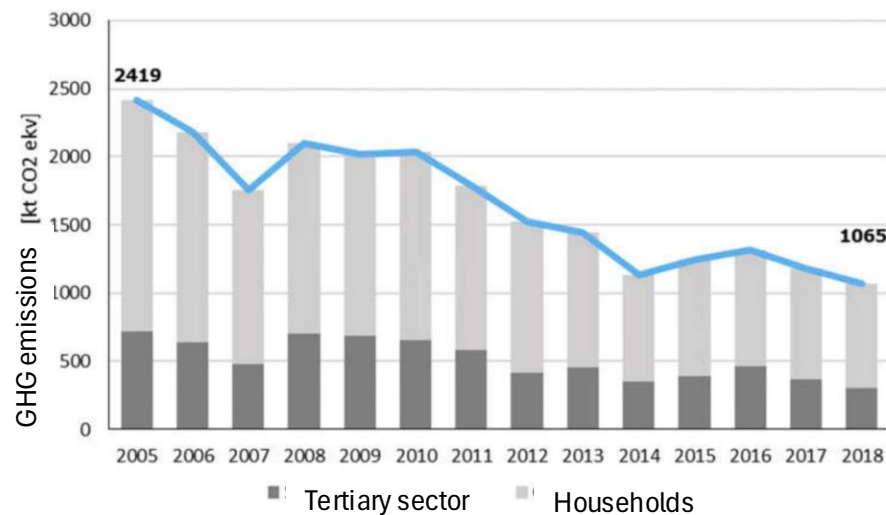


Decarbonization of Slovenian building stock by 2050

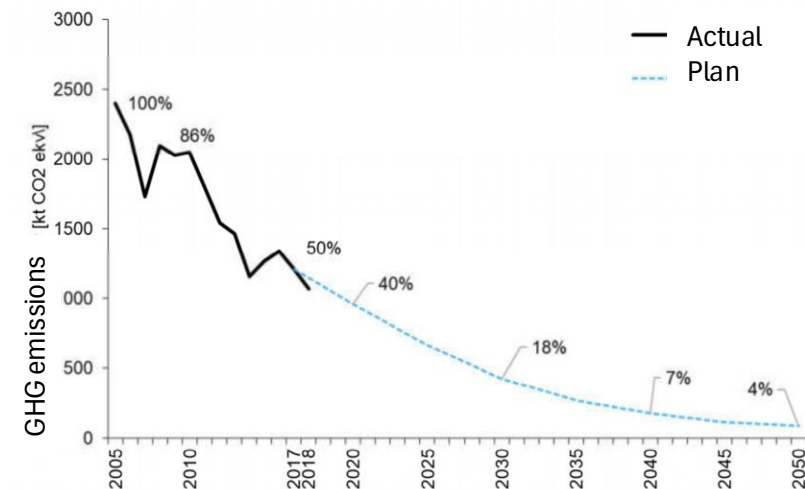
GHG emissions in building sector 2005 >> 2050

Decarbonisation of buildings is in the centre of EU and national policies:

- Renovation wave, Fit for 55 legislation, policies (EPBD, EED, RED... CPR, ESPR ... EU taxonomy, Level(s))
- Long term climate strategy of Slovenia by 2050, LTRS 2050, NECP, energy and construction legislation, building codes...
- In 20 years GHG emissions reduced by 50%, still a long way to zero emission building stock in 2050 (operational + embodied)



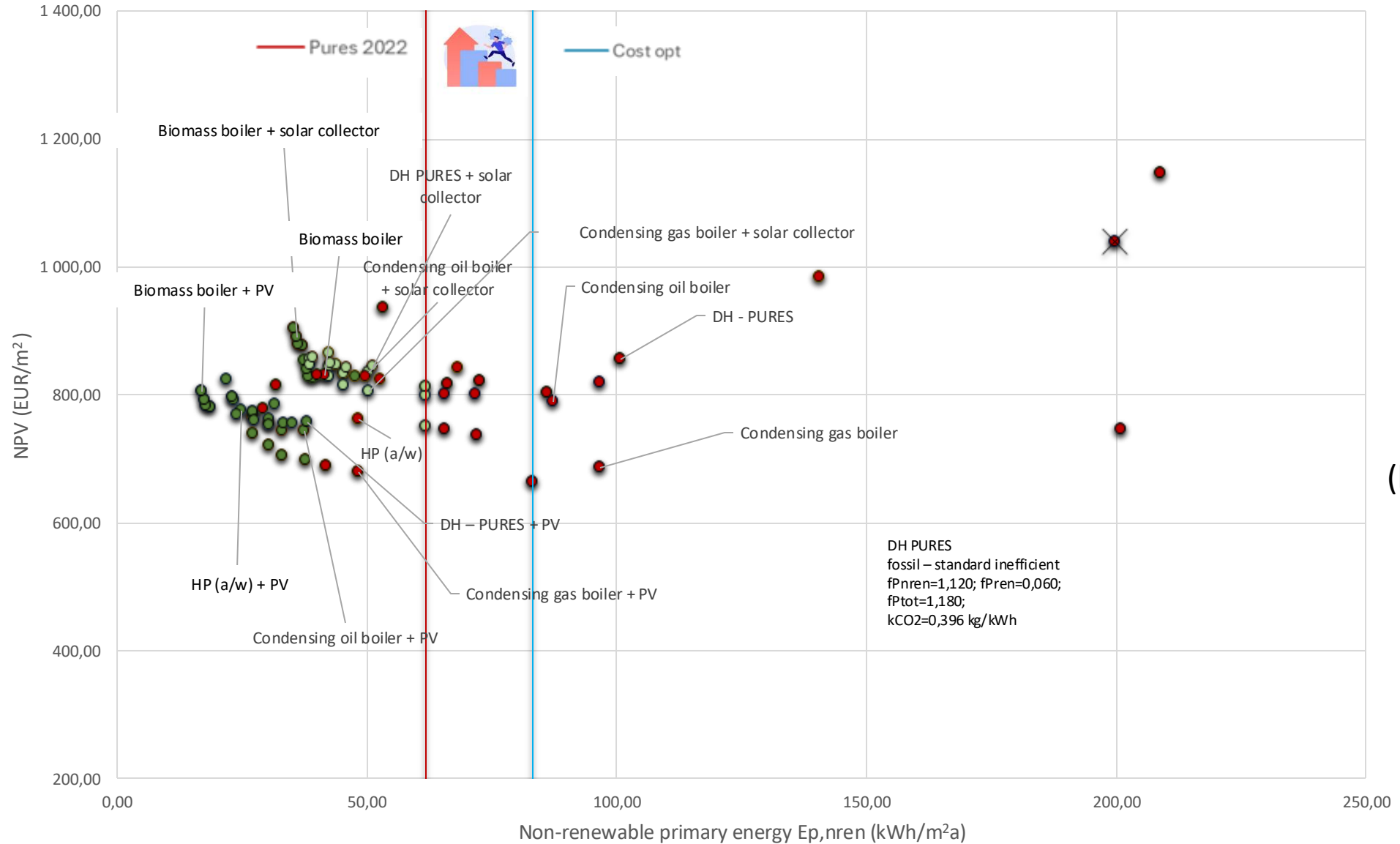
Slika 16: Analiza gibanja emisij TGP v sektorju stavb v obdobju 2005-2018.(vir: IJS CEU)



Slika 17: Cilj zmanjševanja emisij TGP v sektorju stavbe in dosedanje emisije/ Gibanje emisij v obdobju 2005-2018 in predviden potek do leta 2050. (vir: IJS CEU)

https://www.gov.si/assets/ministrstva/MOP/Javne-objave/Javne-obravnavne/podnebna_strategija_2050/dolgorocna_podnebna_strategija_2050.pdf

NSS1 1960 – non-residential building (deep renovation, NPV/ $E_{P,nren}$)



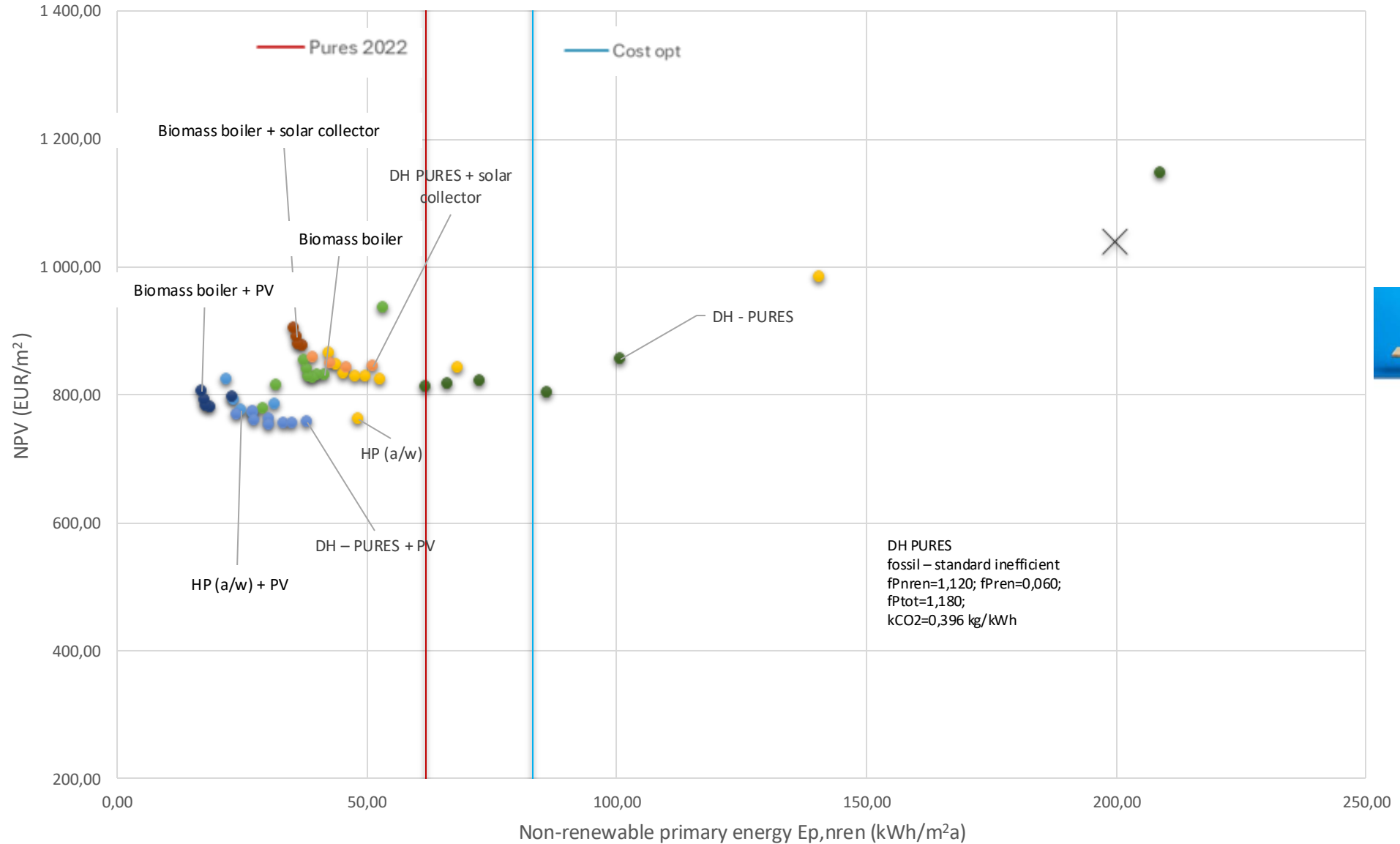
1960, oil boiler renovation

Renovation scenarios
PURES 2022
(building code) compliant

- DA
- DA*
- NE

Energy renovation – cost optimal study

NSS1 1960 – non-residential building (deep ren.; ZEB_2030, NPV/ $E_{P,nren}$)



1960, oil boiler
renovation



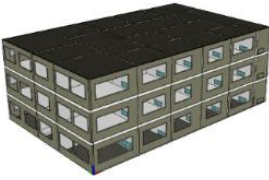
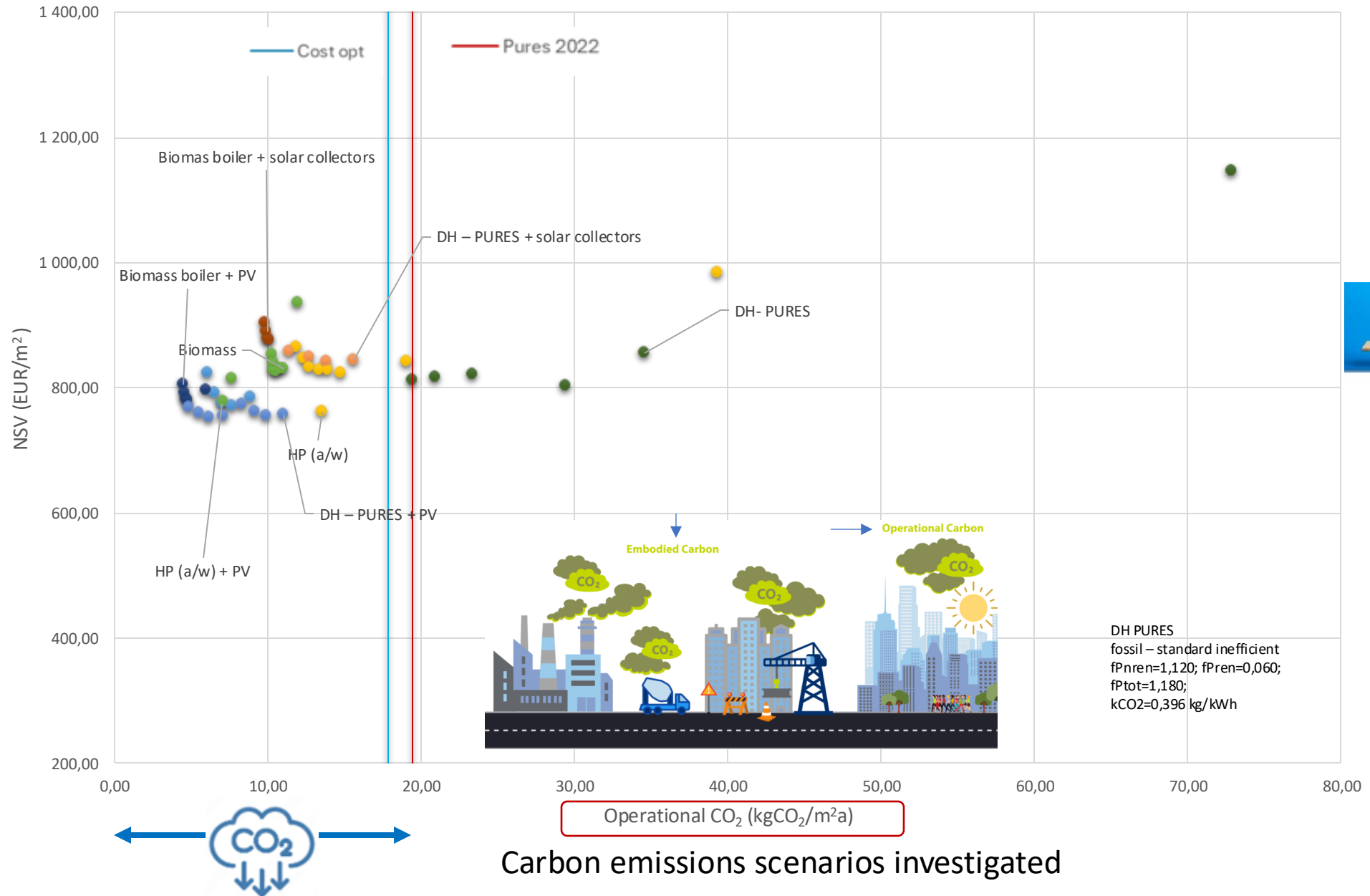
ZEB_2028/2030
Zero emission
buildings

- 0 or a very low amount of energy required,
- 0 on-site carbon emissions from fossil fuels,
- 0 or a very low amount of operational GHG produced

Energy renovation – cost optimal study

NSS1 1960 – non-residential building (deep ren. – ZEB_2030, NPV/operat_CO2)

Operational CO₂ – cost optimal study



1960, oil boiler renovation



ZEB_2028/2030
Zero emission buildings

- 0 or a very low amount of energy required,
- 0 on-site carbon emissions from fossil fuels,
- 0 or a very low amount of operational GHG produced

EPBD (EU/2024/1275) requirements for decarbonisation and support in LIFE IP CARE4CLIMATE project (2019-2026)

EPBD

- Art. 7 - **Zero-emission buildings** - ZEB (2028/2030) , calculation of **life-cycle GWP** (Levels 1.2 GWP)
- Art. 9 - **Minimum energy performance standards** (MEPS) for non-residential buildings and **trajectories** for progressive renovation of the residential building stock
- **Phasing out the use of fossil fuels** in buildings
- **Solar energy** and sustainable mobility
- **Deep renovation** = energy efficiency first + NZEB (before 1 Jan. 2023) / ZEB (after 1 Jan. 2030)
- Step-by - step / **phased renovation, building renovation passport**
- Deep renovation & **other aspects** (IEQ, seismic and climate resilience, fire safety...)
- **Sustainable financing**
- Art. 26 - **Certification of building professionals** carrying out integrated renovation works

LIFE IP CARE4CLIMATE

- **Adapting EU Level(s) to Slovenian conditions**
- Capacity building of designers for using Level(s) in building projects, pilots
- **Training of experts – facilitations** of deep renovation projects
- **Quality label in Civil Engineering ZKG** for products and services contributing to decarbonization of the the building stock

Development of SLO Sustainable Building Indicators SLO SBI (SLO kTG) based on Level(s)

2020-2019

2022-2021

2024-2023

2026-2025

7

Consultation with national stakeholders
Development of **alpha version** of SLO SBI

Testing of alpha version of SLO SBI
2nd consultation with stakeholders
Upgrade to next level, **beta version of indicators** and SBI system

3rd consultation with stakeholders
Weighting of indicators and SBI
assessment system

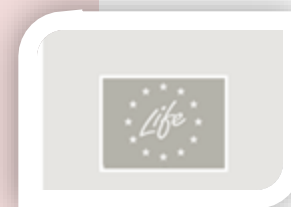
Testing of beta version of indicators and SB system on **pilot** projects
Analysing feed back from pilot use of beta SB indicators and SBI
system

Development of final version kof SB indicators, and endorsement of
SBI system

Trainings for users per target groups

Support framework
and e-platform

www.kazalnikitrajnostnegradnje.si



LIFE IP CARE4CLIMATE
(LIFE17 IPC/SI/000007)

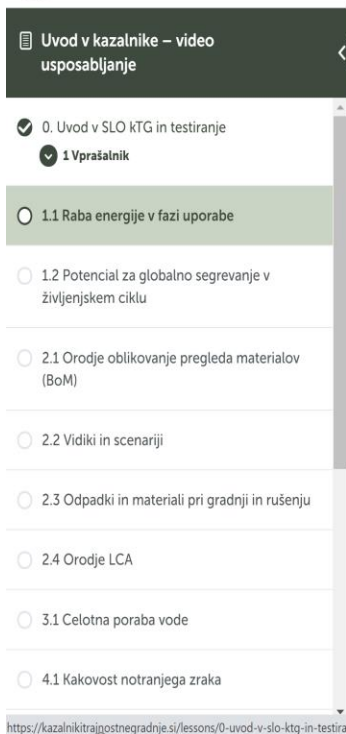
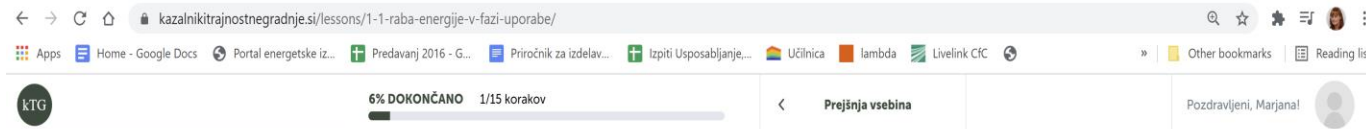
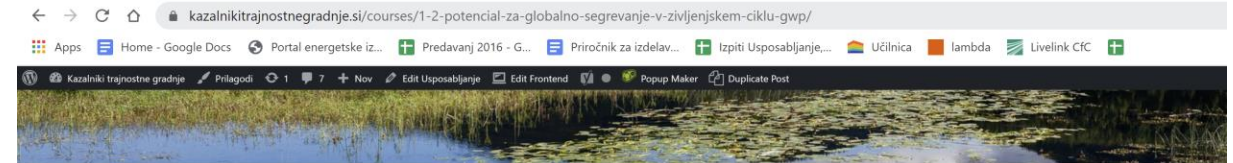


SLO kTG



E-platform of sustainable building – testing of SLO SBI based on EU Level(s)

- Video lectures
- Training course, quiz...
- www.kazalnikitrajnostnegradnje.si



Kazalnik 1.1 *Raba energije v fazi uporabe* obravnava energijsko učinkovitost obravnavane stavbe z dvema podkazalnikoma, to sta raba primarne energije v fazi uporabe stavbe in raba dovedene (končne) energije. S kazalnikom naslavlja energijsko učinkovitost stavbnega ovoja in tehničnih sistemov v stavbi ter rabo obnovljivih virov energije.

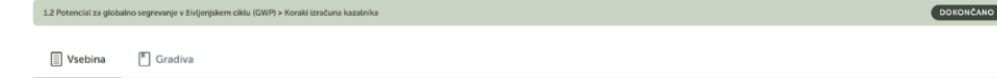


1.2 Potencial za globalno segrevanje v življenjskem ciklu (GWP)



Kazalnik 1.2 *Potencial za globalno segrevanje v življenjskem ciklu (GWP)* obravnava določitev le-tega v življenjskem ciklu stavbe od zibelke do groba, torej od faze pridobivanja surovin, ki se kasneje uporabljajo kot materiali in proizvodi za gradnjo, do razgradnje stavbe in morebitne ponovne uporabe, recikliranja in upravljanja z gradbenimi odpadki. Vključuje tudi fazo uporabe, kjer na kazalnik vplivajo zlasti raba energije pri uporabi stavbe ter vzdrževanje, popravila, zamenjave elementov in prenova stavbe.

Koraki izračuna kazalnika



Izračun kazalnika

Metodologija izračuna

V okviru Kazalnika 1.2 *Potencial za globalno segrevanje v življenjskem ciklu (GWP)* določamo izpuste toplogrednih plinov (TGP[2]) povezane z različnimi fazami v življenjskem ciklu stavbe. Kazalnik meri prispevek stavb k emisijam, ki prispevajo k globalnemu segrevanju zemlje in posledično vplivajo na podnebne spremembe. Postopek določanja vrednosti Kazalnika 1.2 včasih poimenujemo tudi ocena oglednega odtisa.

Kazalnik 1.2 izrazimo kot potencial za globalno segrevanje (GWP) zaradi izpustov toplogrednih plinov. Merska enota je kg CO₂ ekvivalenta na m² uporabne površine stavbe v referenčnem opazovanem obdobju 50 let.

Rezultate lahko poročamo za vsako fazo življenjskega cikla ločeno: torej za fazo proizvodnje in gradnje (A), fazo uporabe (B), fazo konca življenjskega cikla (C) in za dodatne koristi in obremenitve (D) (Slika 1-2).

Ce okoljske vplive stavbe analiziramo poglobljeno, tako da izvajamo analizo LCA od zibelke do groba po enaki metodologiji, kot je v uporabi pri določanju Kazalnika 1.2, potem na koncu tudi poročamo o devetih kategorijah kazalnikov okoljskih učinkov (in ne le o GWP).



Slika 1-2: Faze življenjskega cikla stavbe po CEN/TC 350

Launching pilot projects (2023....2025)

beta version of SLO SBI (SLO KTG) based on Level(s)

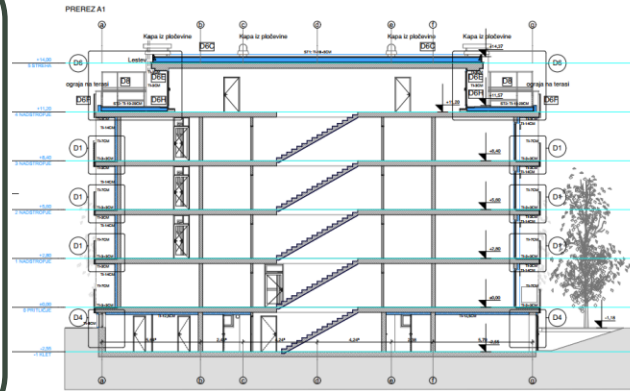
Raven 1

Idejna zasnova stavbe, ki vključuje zgodnjo kvalitativno oceno



Raven 2

Načrtovanje in gradnja stavbe, ki vključuje kvantitativno oceno projektiranega stanja in spremljanje gradnje



Arh. M.Kramar, projekt Kumanovska, GI ZRMK

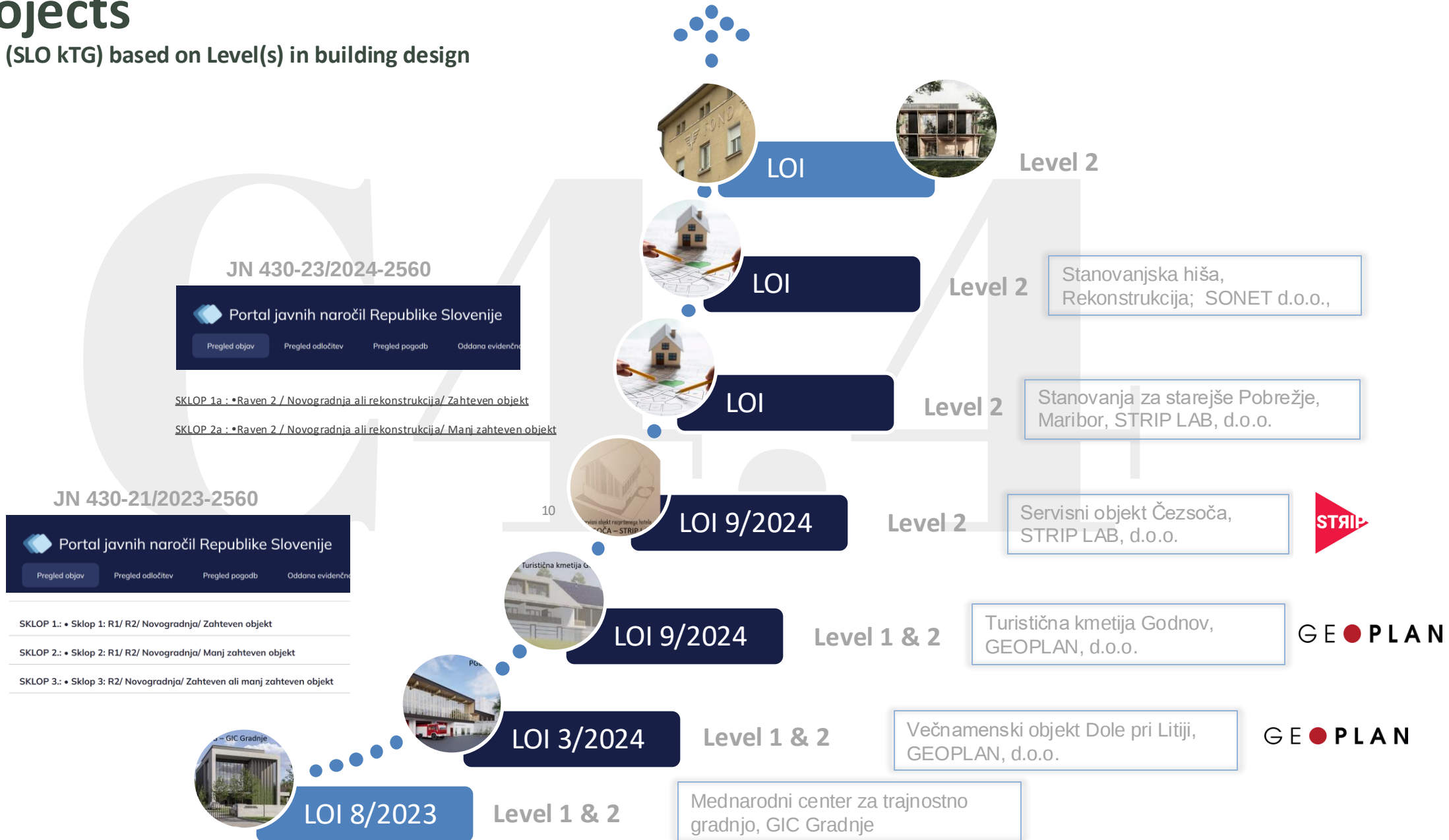
- **Level 1** – use in initial design – qualitative assessment of 16 indicators
- **Level 2** – use in detailed design – quantitative assessment of 11 indicators

kTG	Kazalniki trajnostne gradnje po EU Level(s)	Raven 1	Raven 2	Raven 3
OKOLJE - Poraba virov in okoljske lastnosti v življenjskem ciklu stavbe				
Makro cilj 1 Emisije toplogrednih plinov v življenjskem ciklu stavb	1.1 Raba energije v fazi uporabe stavbe	kTG	kTG	kTG
	1.2 Potencial za globalno segrevanje v življenjskem ciklu (GWP)	kTG	kTG	kTG
Makro cilj 2 Z viri učinkovit in krožen snovni življenjski cikel	2.1 Seznam količin, materialov in življenjske dobe	kTG	kTG	kTG
	2.2 Odpadki in materiali pri gradnji in rušenju	kTG	kTG	kTG
	2.3 Načrtovanje za prilagodljivost in prenavo	kTG	kTG	kTG
	2.4 Načrtovanje za razgradnjo, ponovno uporabo in recikliranje	kTG	kTG	kTG
Makro cilj 3 Učinkovita raba vodnih virov	3.1 Raba vode v fazi uporabe stavbe	kTG	kTG	kTG
ČLOVEK - Zdravje in ugodje				
Makro cilj 4 Zdravje in ugodje v bivalnih prostorih	4.1 Kakovost notranjega zraka	kTG	kTG	kTG
	4.2 Čas zunaj območja toplotnega ugodja	kTG	kTG	kTG
	4.3 Svetloba in vidno ugodje*	kTG		
	4.4 Akustika in zaščita pred hrupom*	kTG		
Makro cilj 5 Prilagajanje in odpornost na klimatske spremembe	5.1 Zaščita uporabnikovega zdravja in toplotno ugodje	kTG	kTG	
	5.2 Povečano tveganje ekstremnih vremenskih pojavov*	kTG		
	5.3 Trajnostno odvodnjavanje*	kTG		
GOSPODARNOST - Stroški, vrednost in tveganje				
Makro cilj 6 Optimizacija stroškov življenjskega cikla in vrednost	6.1 Stroški življenjskega cikla	kTG	kTG	kTG
	6.2 Oblikovanje vrednosti in dejavniki tveganja	kTG		

Pilot projects

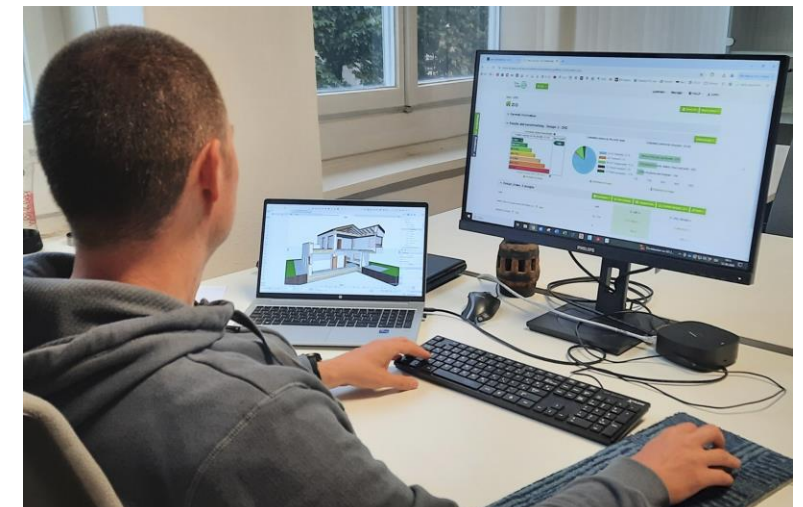
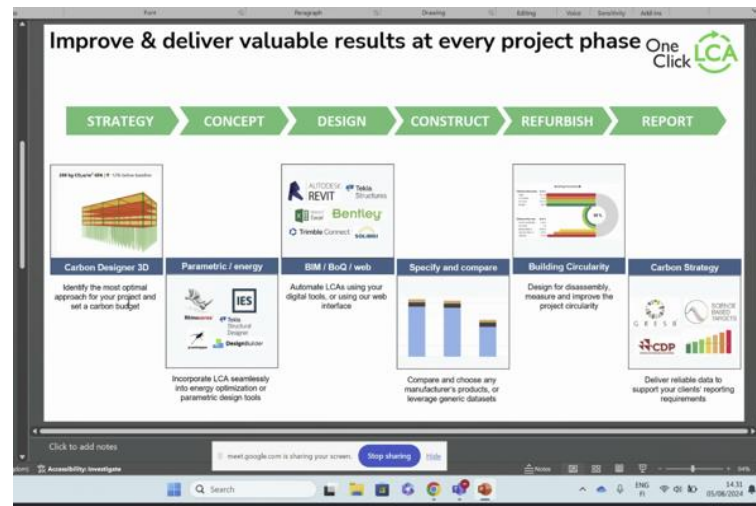
testing of SLO SBI (SLO kTG) based on Level(s) in building design

SLO kTG



Collaborative space for pilots – One Click LCA tool

- Design optimization
- BIM >> BoM, BoQ
- One Click LCA
- GWP, LCA, LCC
- Reporting
- GWP database > benchmark



Training of building professionals for deep renovation and NZEB/ZEB deployment

6 main topics

1. Deep renovation for multi-family buildings (building managers, inspectors...)
2. Air-tightness and heat recovery in ventilation, IAQ (engineers, contractors, investors, decision makers...) *
3. EE windows and quality of installation of windows*
4. On thermal insulation of envelope (green and heritage sensitive solutions)
5. HVAC technologies and RES in building renovation (engineers, energy consultants, owners, investors)*
6. Comprehensive renovation, combined “energy – seismic” renovation (engineers, energy consultants, energy managers...)*.

*BUILD UP Skills Slovenia

Facilitators of deep, NZEB/ZEB, wider, sustainable renovation



Target group:

building owners in private, public and other tertiary sector, architects, engineers, planner, control, inspectors, building contractors, energy advisors, auditors, energy performance contractors, building /facility managers, financing actors, decision makers.



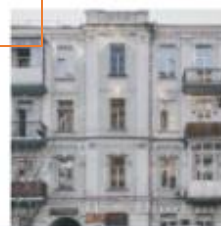
U1 - Celovita prenova večstanovanjskih stavb



U2 - Zagotavljanje zrakotesnosti in mehansko prezračevanje z rekuperacijo pri prenovi stavb



U3 - Energijsko učinkovito zunanje stavbno pohištvo in njegova vgradnja



U4 - Toplotna zaščita stavbnega ovoja z upoštevanjem okoljskega in kulturnovarstvenega vidika



U5 - Sistemi gretja, zračenja in klimatizacije s poudarkom na OVE pri energijski prenovi stavb



U6 - Širša, energijska in protipotresna prenova stavb

Implementation of 6 years x 6 trainings

- **3-days training (3 x 8h)**
- www.trajnostnagradnja.si
- Lectures on-line/live
- Site visits
- Practical examples, homework
- Final exam (on-line within 1 month)
- 2 x follow-up events annually (networking, feed-back),

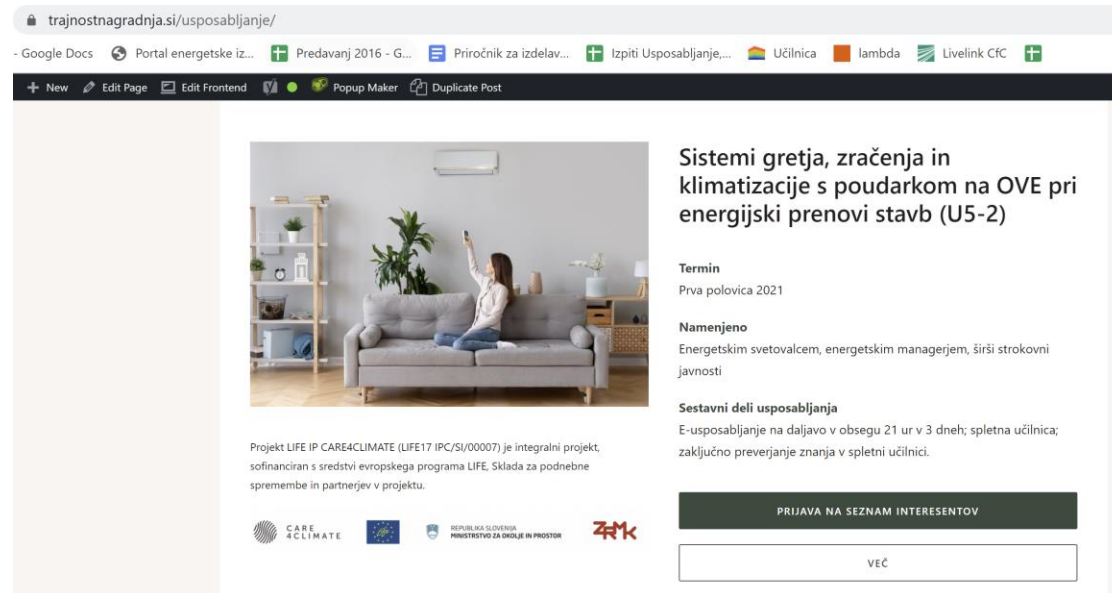
Target:

- 720 trained persons by 2026

After 25/36 training courses (75%):

- Registered: 1391, Trained: **1163**, Exam: 693

Micro-credential in non-formal training



trajnostnagradnja.si/usposabljanje/

Google Docs Portal energetske iz... Predavanje 2016 - G... Priročnik za izdelav... Izpiti Usposabljanje... Učilnica lambda Livink Cfc

New Edit Page Edit Frontend Popup Maker Duplicate Post

Sistemi gretja, zračenja in klimatizacije s poudarkom na OVE pri energijski prenovi stavb (U5-2)

Termin
Prva polovica 2021

Namenjeno
Energetskim svetovalcem, energetskim managerjem, širši strokovni javnosti

Sestavni deli usposabljanja
E-usposabljanje na daljavo v obsegu 21 ur v 3 dneh; spletna učilnica; zaključno preverjanje znanja v spletni učilnici.

PRIJAVA NA SEZNAM INTERESENTOV

VEČ

Projekt LIFE IP CARE4CLIMATE (LIFE17 IPC/SI/00007) je integralni projekt, sofinanciran s sredstvi evropskega programa LIFE. Sklada za podnebne spremembe in partnerjev v projektu.

CARE 4CLIMATE REPUBLIKA SLOVENIJA MINISTRSTVO ZA OKOLJE IN PROSTOR ZRMK



CARE 4CLIMATE REPUBLIKA SLOVENIJA MINISTRSTVO ZA OKOLJE IN PROSTOR ZRMK

POTRDILO

Potrdujemo, da je

Katarina Richter

uspešno zaključila usposabljanje

ŠIRŠA, ENERGIJSKA IN PROTIPOTRESNA PRENOVA STAVB

ki je potekalo 24., 25. in 26. marca 2021.

Tridnevno usposabljanje v obsegu 21 ur je potekalo v okviru integralnega projekta LIFE IP CARE4CLIMATE, "Akcija C2.2 Priprava, izvedba in spremljanje ciljnih usposabljanj na področju URE, OVE in zelenih tehnologij ter prepoznavanje pridobljenih znanj in spretnosti", po učnem načrtu U6-2 in programu neformalnega izobraževanja, ki ga je pripravil Gradbeni inštitut ZRMK.

Udeleženka je pridobila znanje in veščine na področju širše, energetske in protipotresne prenove stavb v zvezi z aktualno zakonodajo, politiko in strategijami, novostmi in izzivi na področju širše prenove stavb, usmeritvami za prenovo na podlagi dobrega gospodarjenja s stavbami in strokovne učinkovitosti, bistvenimi zahtevami za gradbene objekte, vključno z načeli varovanja kulturne dediščine, sprožilci in spodbujevalci širše, energetske in protipotresne prenove pri nas in v sosednjih državah



Quality label in building and civil engineering (ZKG)

- ZKG is a Slovenian national environmental certificate based on environmental, economic and social components in quality of the product or service
- **198 ZKG** labels awarded (since 1996) to building products and services

1	“Installation of windows and doors with consideration of sustainability impacts” (service)
2	“Development achievements in green technology” (product)
3	“Design process for comprehensive building renovation” (service)
4	“Setting up a photovoltaic power plant for self-supply” (service)
5	“Execution of refurbishment and/or replacement of windows and door in heritage buildings” (service)
6	“Execution of wider renovation of heritage buildings” (service)
7	“Windows and doors with consideration of environmental impacts” (product)



Status: 2022 (3 ZKGs), 2023 (4 ZKGs), 2024 (5 ZKGs), 2025 (6 ZKGs) awarded





Thank you!

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Gradbeni inštitut ZRMK
Building and Civil Engineering Institute

