Train-to-NZEB

The Building Knowledge Hubs

Development of nZEB in Romania – towards an effective implementation

CONFERENCE “WAY TO NEARLY ZERO ENERGY BUILDINGS”

2 MARCH 2017, PRAGUE

This project has received funding from the European Union’s Horizon 2020 research and innovation programme under grant agreement No 649810

Dr. ing. Horia Petran
NIRD URBAN-INCERC

URBAN INCD INCERC

Speaking about …

- EU framework – policies for Climate & Energy → nZEB
- Definition of nZEB in Romania
- What does requires to be nZEB?

- Cost optimal → new thinking for setting nZEB levels
- Train-to-nZEB: building competences
- Perspectives → nZEB

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EU's 2020 Framework for Climate and Energy – where do we stand?

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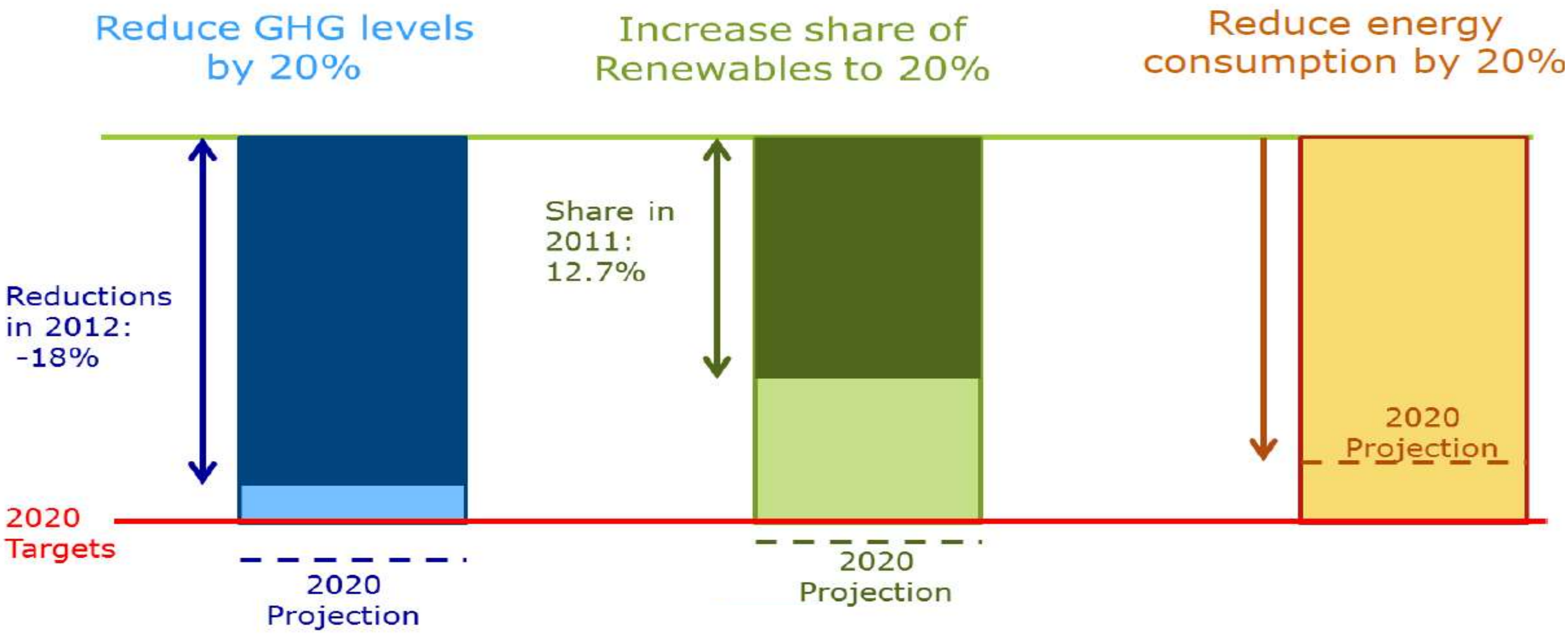

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Proposed EU's 2030 Framework for Climate and Energy – where?

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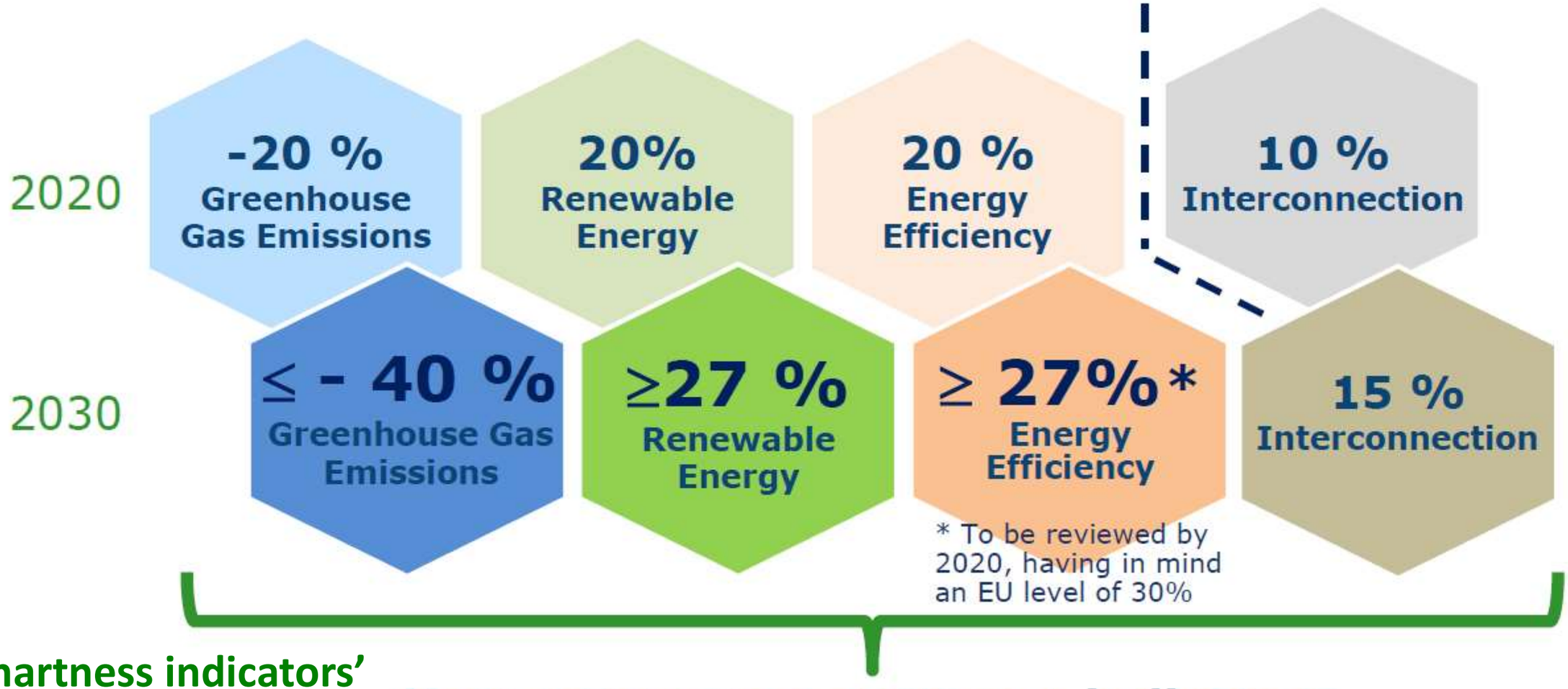

\+ ‘Smartness indicators’ for buildings

New governance system + indicators

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EU's 2030 Framework for Climate and Energy - Why a new framework now?

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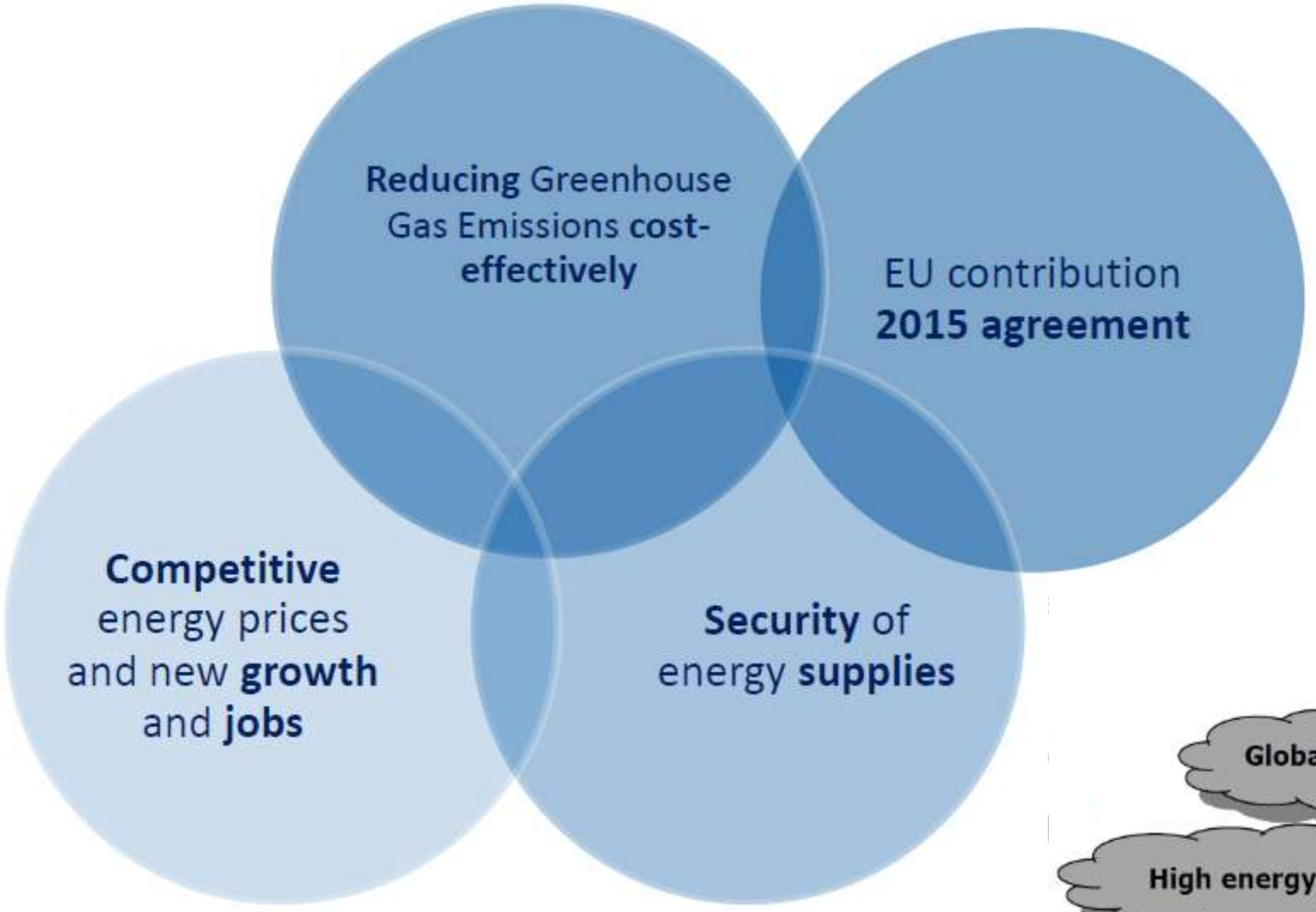


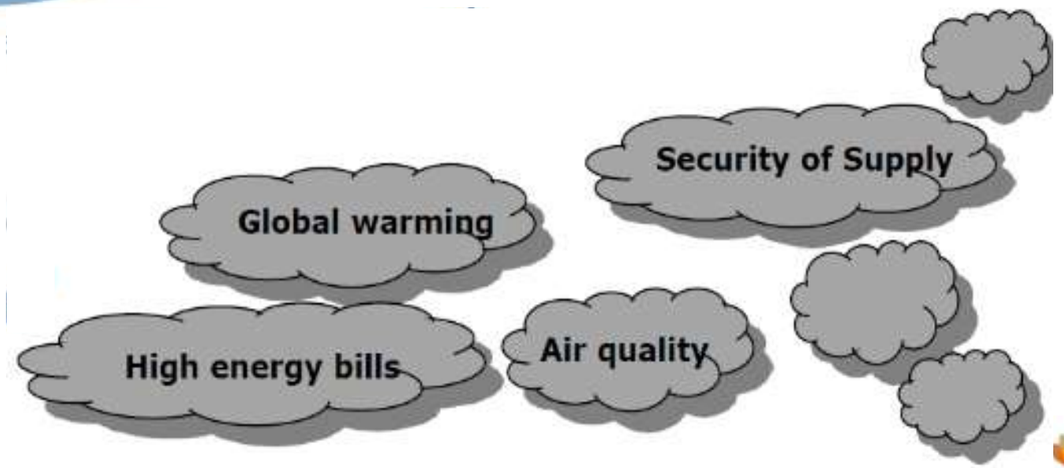
Challenges

…

Opportunities

…

Benefits



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nZEB = nearly Zero Energy Building

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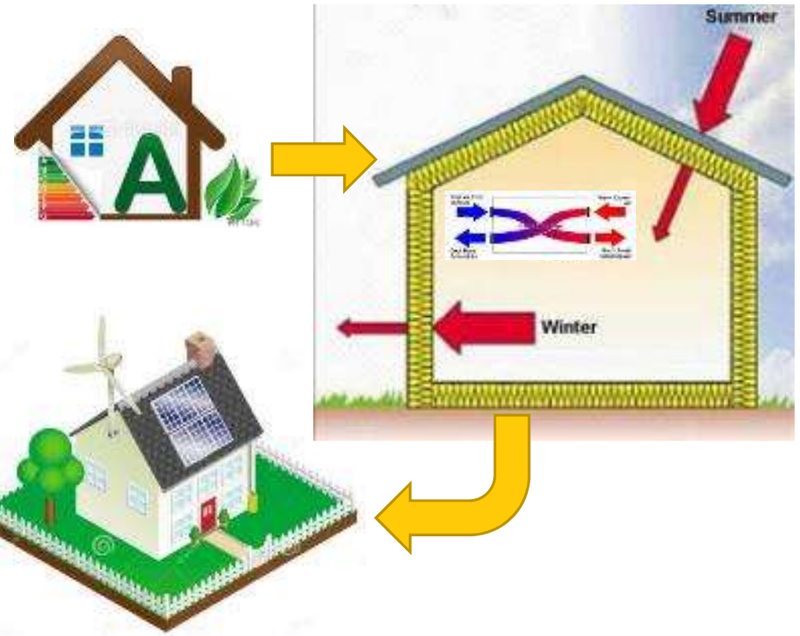
a building that has a very high energy performance, as determined in accordance with Annex I. The nearly zero or very low amount of energy required should be covered to a very significant extent by energy from renewable sources, including energy from renewable sources produced on-site or nearby

Primary energy
< x kWh/m²/yr

Renewables Share
> y % PE

CO_2 Emissions
< z kg/m²/yr



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Niveluri de performanță - nZEB

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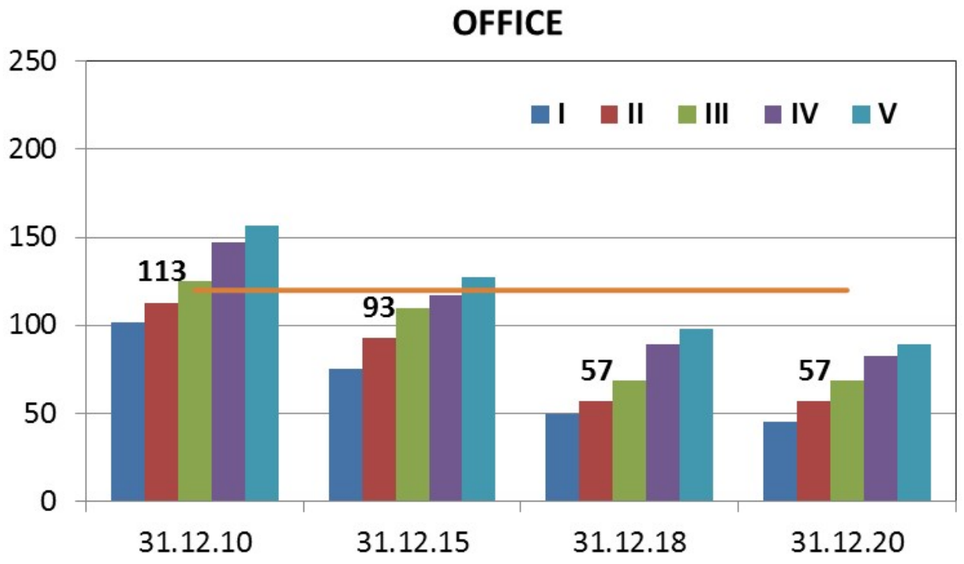
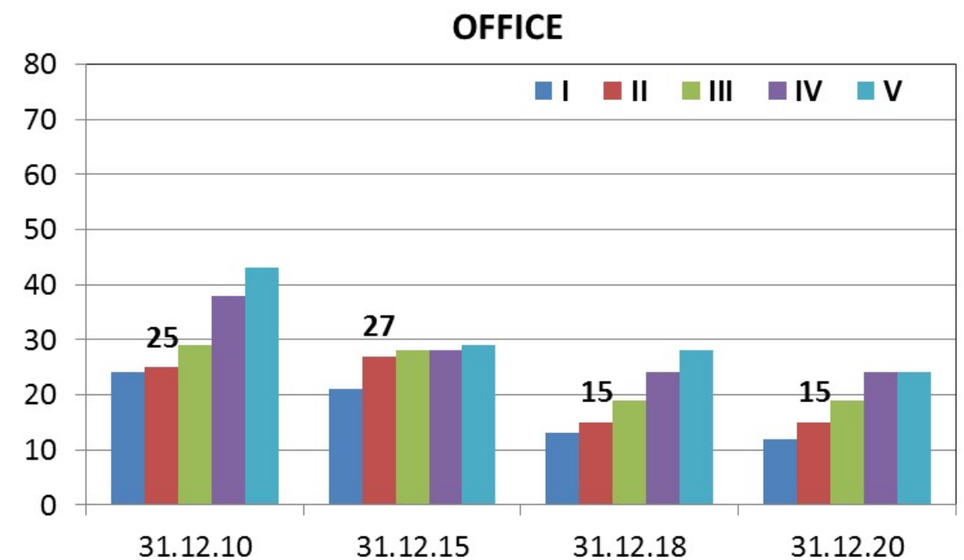
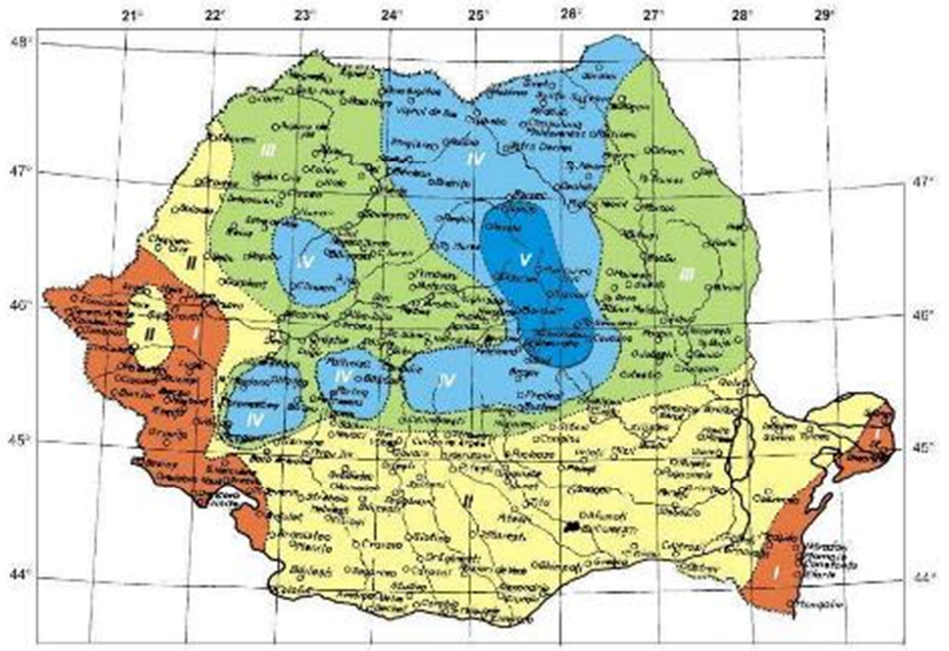
Primary energy
< x kWh/m²/yr



CO_2 Emissions
< z kg/m²/yr



Renewables Share
> 10 % PE



Climatic areas – Romania (Design conditions – space heating / winter)

Zone I : $\theta e_o = -12$ °C
Zone II : $\theta e_o = -15$ °C
Zone III : $\theta e_o = -18$ °C
Zone IV : $\theta e_o = -21$ °C
Zone V : $\theta e_o = -24$ °C

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Niveluri de performanță - nZEB

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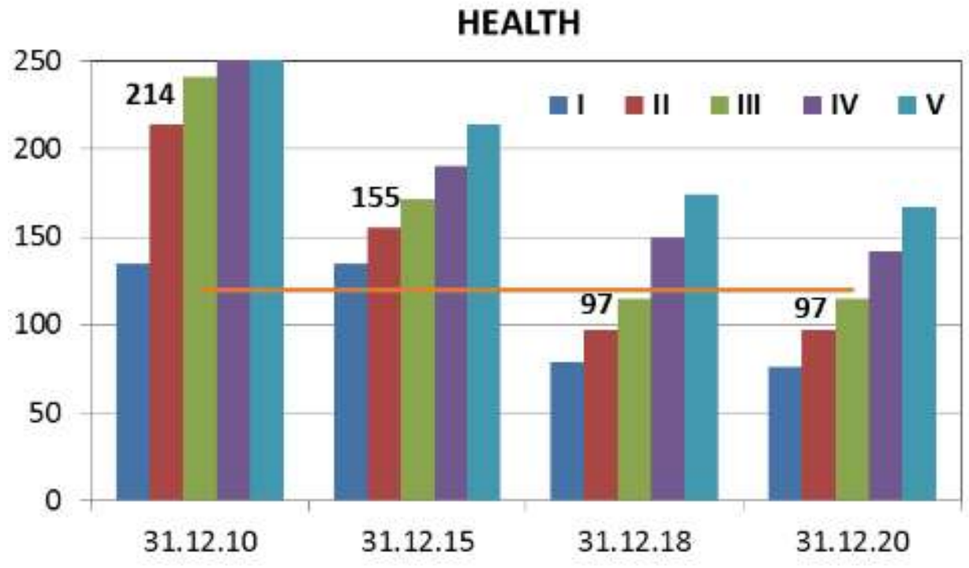
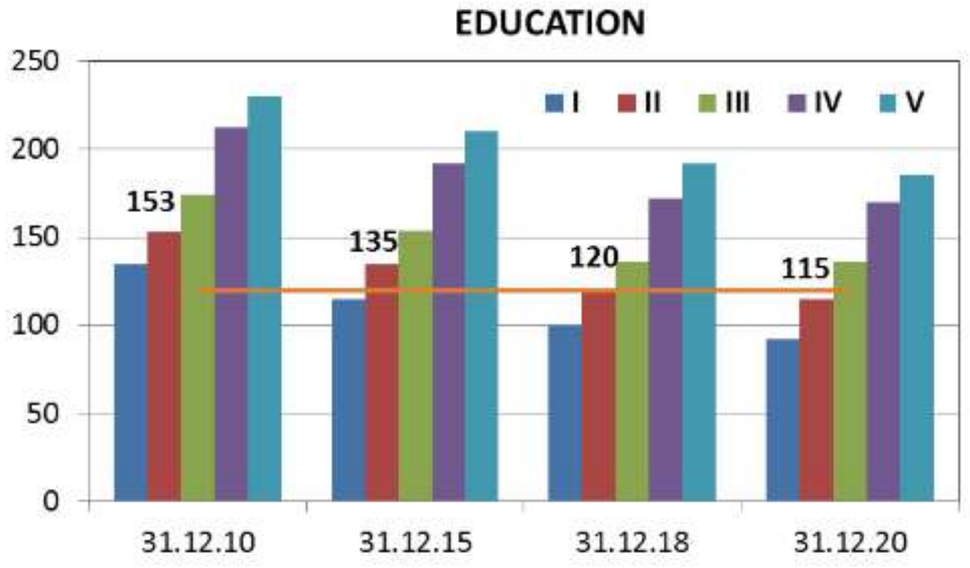
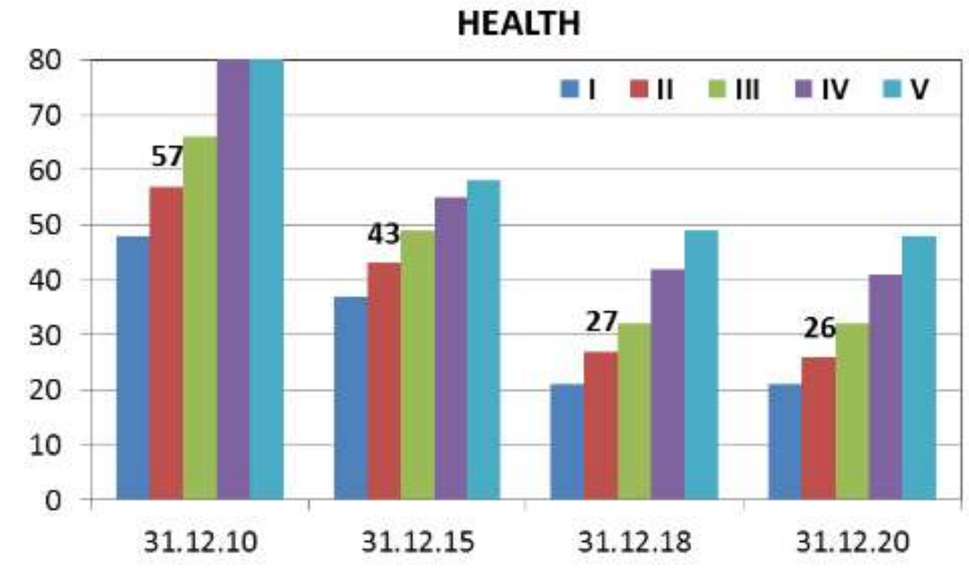
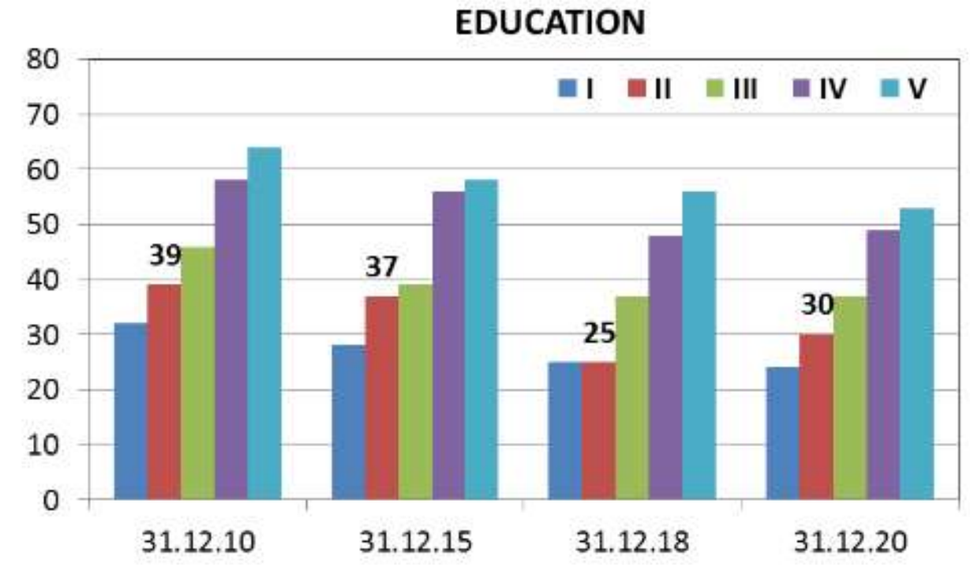
Primary energy
< x kWh/m²/yr





CO_2 Emissions
< z kg/m²/yr





Renewables Share
> 10 % PE

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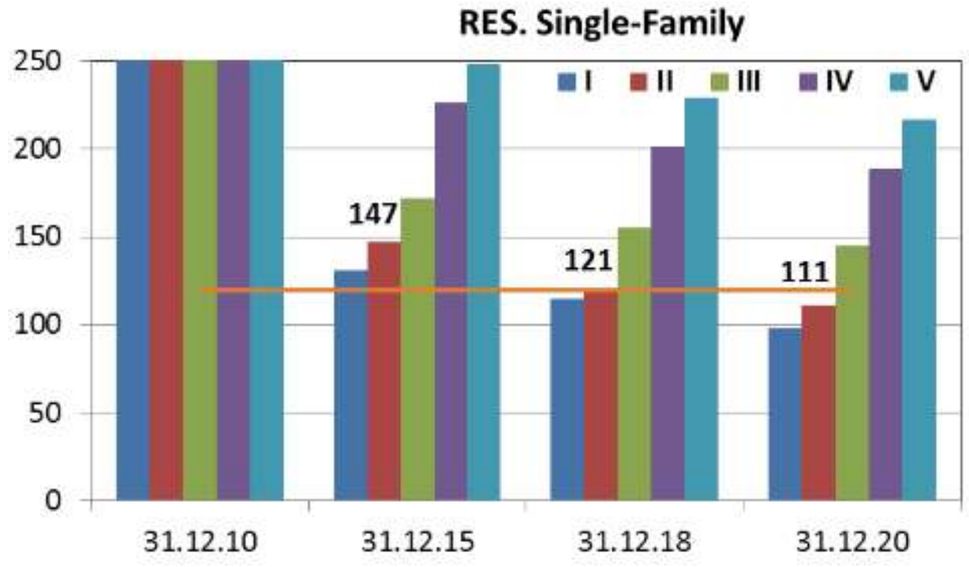
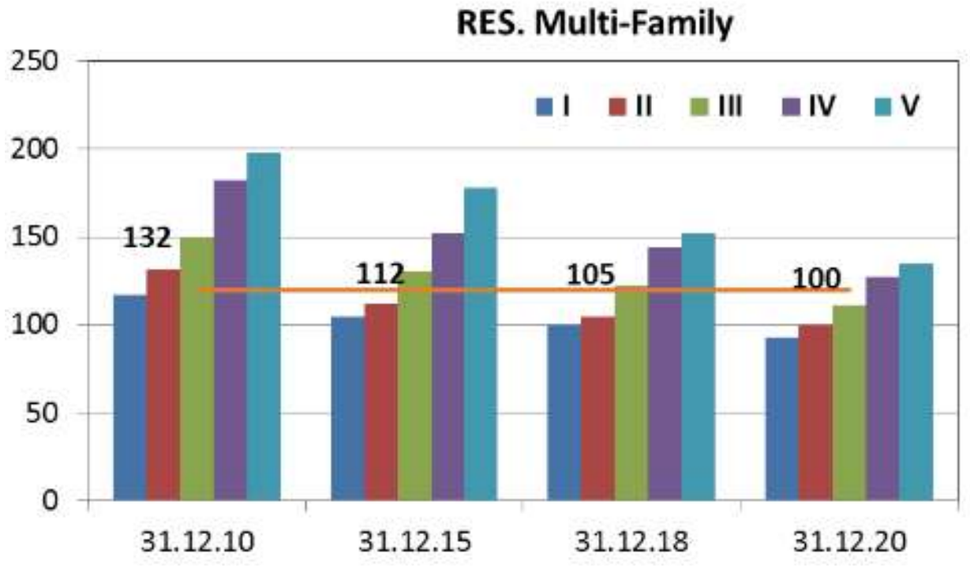
INCERC

Niveluri de performanță - nZEB

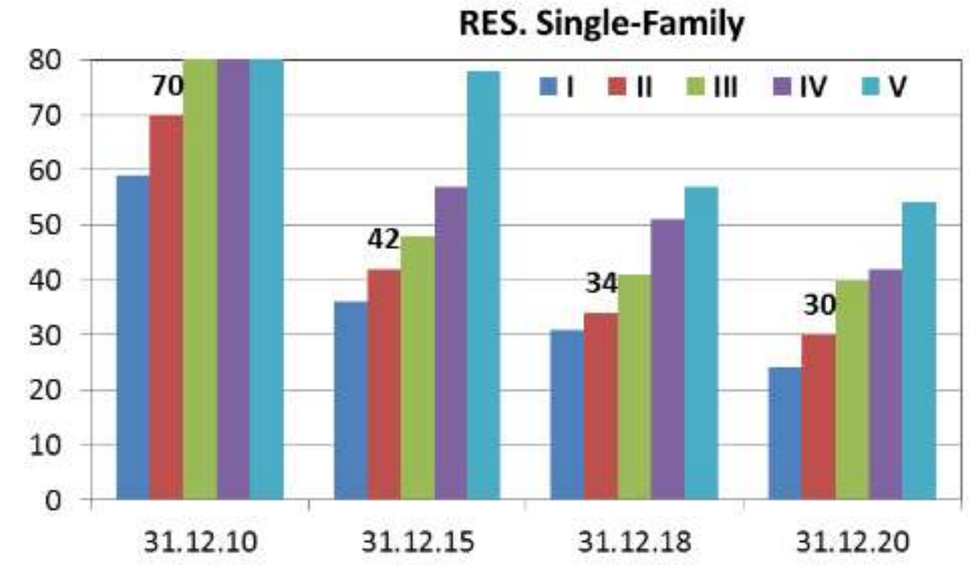
Train-to-NZEB

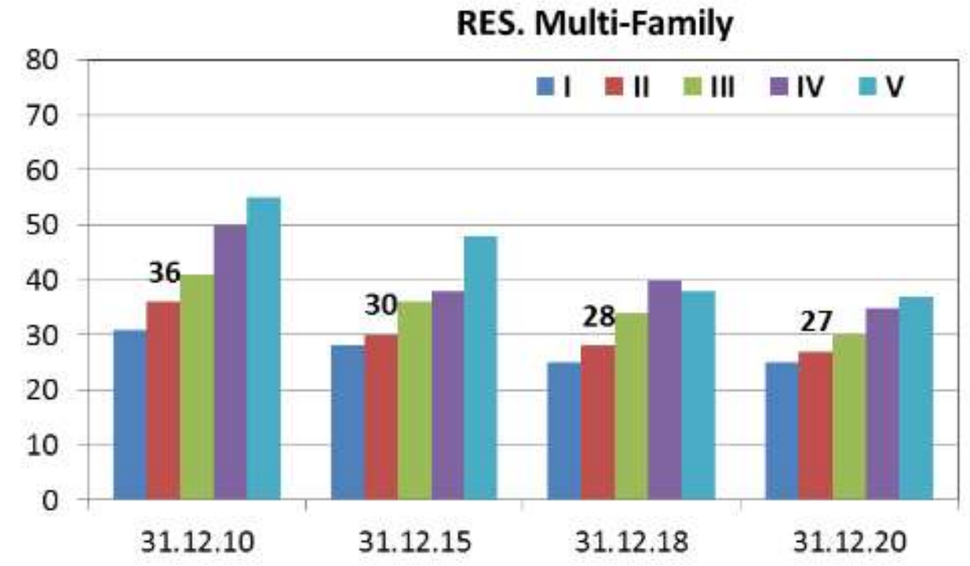
Primary energy
< x kWh/m²/yr





CO_2 Emissions
< z kg/m²/yr





Renewables Share
> 10 % PE

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Usual practice – construction sector (2013)

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Qualification in the construction sector

- ✓ **Barriers** and **bottlenecks** (qualification in construction sector):
  - ✓ **lack of sufficient financing** sources open to construction companies to qualify their workers,
  - ✓ **poor recognition** of high quality works in constructions, **no mandatory requirements** for certified qualified workers
- ✓ **Need to change current practices and mentality in the construction sector**:
  - ✓ **managers of construction companies** – to understand the importance of qualification level in relation to obtained quality, efficiency and productivity,
  - ✓ **employees** – to generate a self-control attitude (which could be obtained by qualification).
- ✓ Effective implementation of **nZEB** requirements represents a **great challenge** which cannot be adequately undertook without mastering the application of new concepts and technologies → **higher qualification level for workers.**

Modification of current solutions – best practice → nZEB

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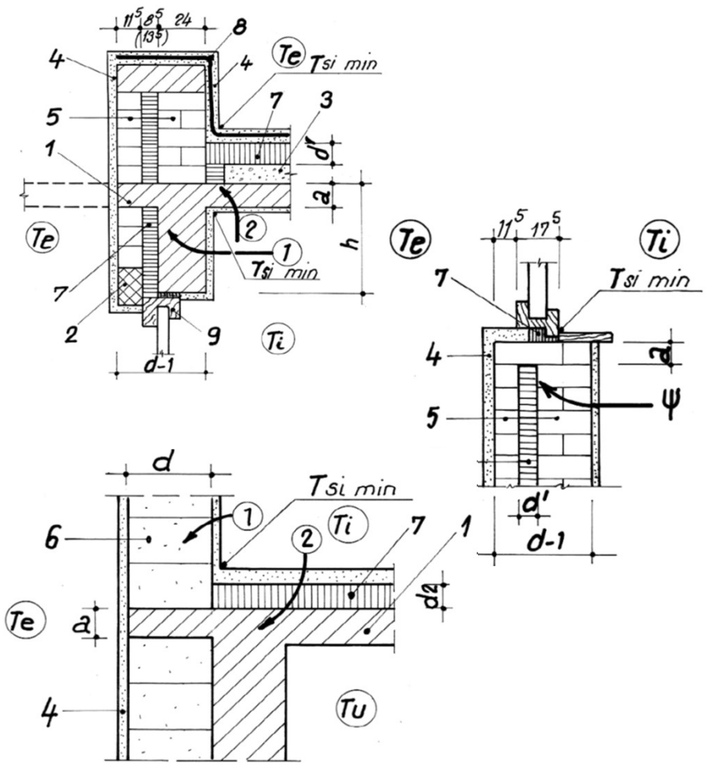
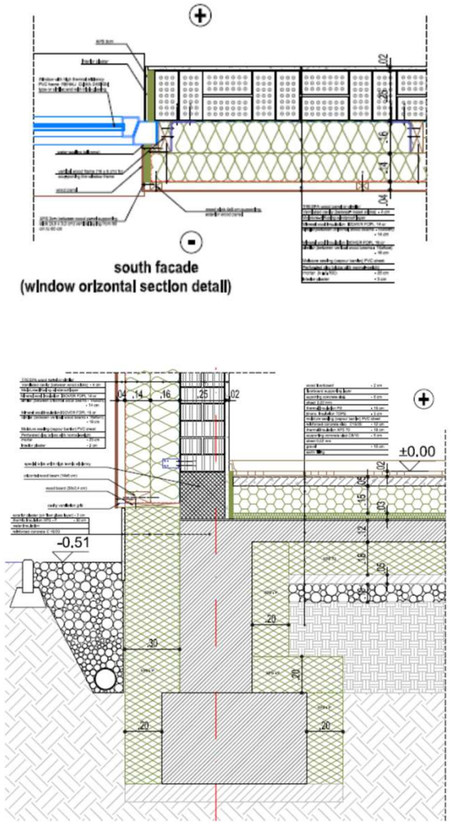
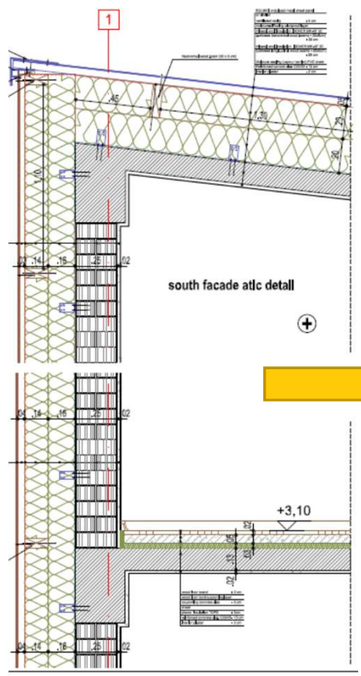
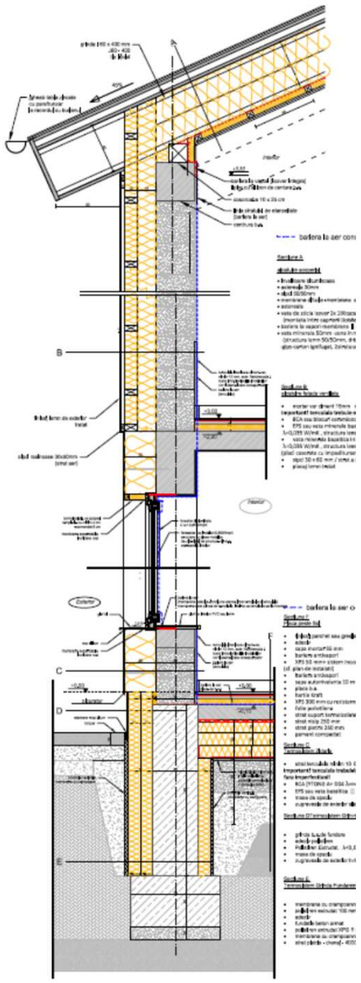
Details for improved constructive solutions

Analyse existing construction practice in Romania and define best practice → suitability for nZEB / PH









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Details → nZEB (insulation – thermal bridges)

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a simple example ...

Where to place the window …

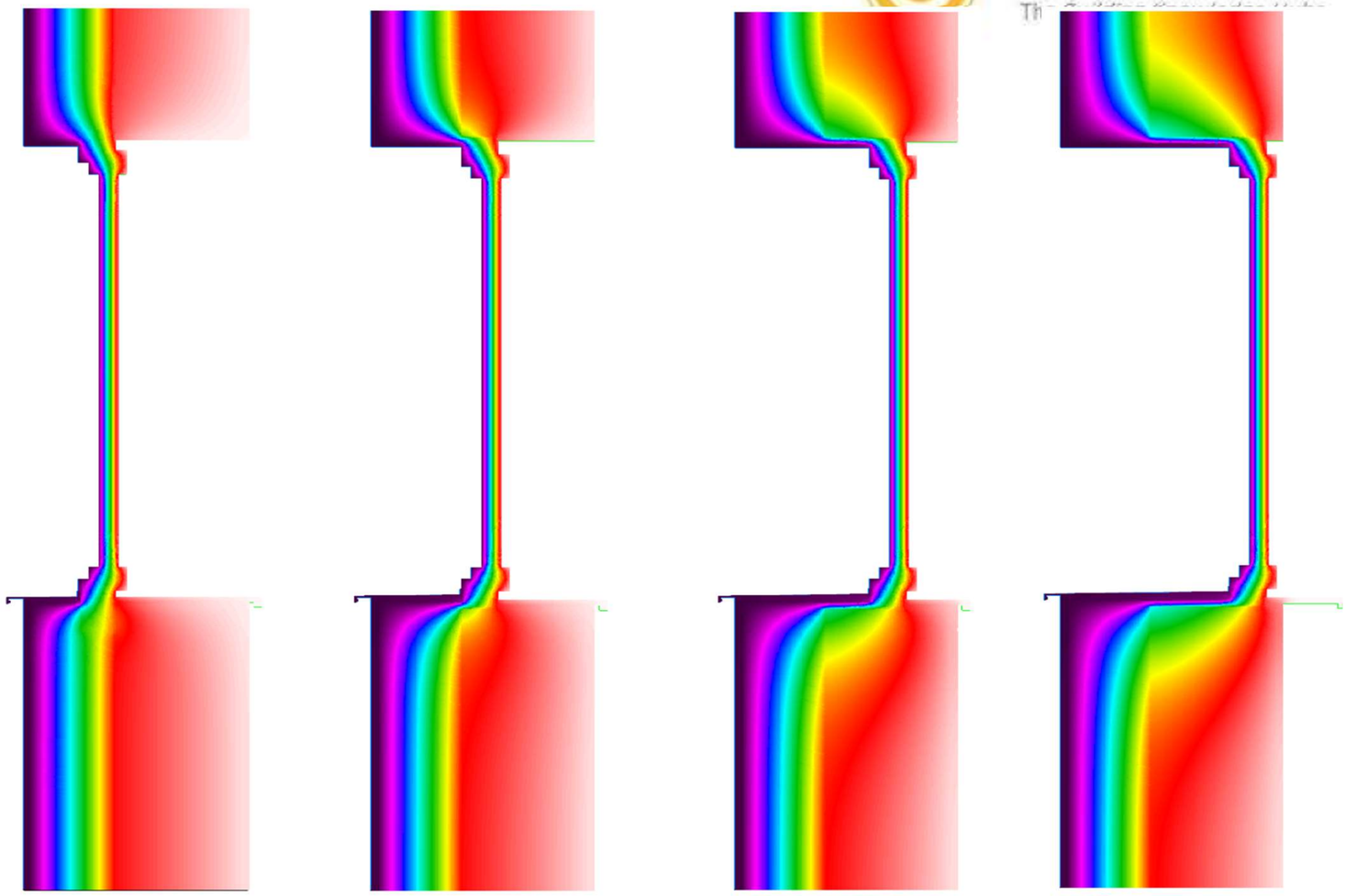
U_W = 0,816 W/m²K

U_{1D} = 0,136 W/m²K

Design winter cond. Zone II

Façade 3,0 x 2,8 m²

Window 1,2 x 1,5 m²



U'_{Pe} [W/m²K] = 0,149	0,173	0,215	0,248
Total heat flow [W] = 85,7	+7,0%	+18,3%	+27,3%

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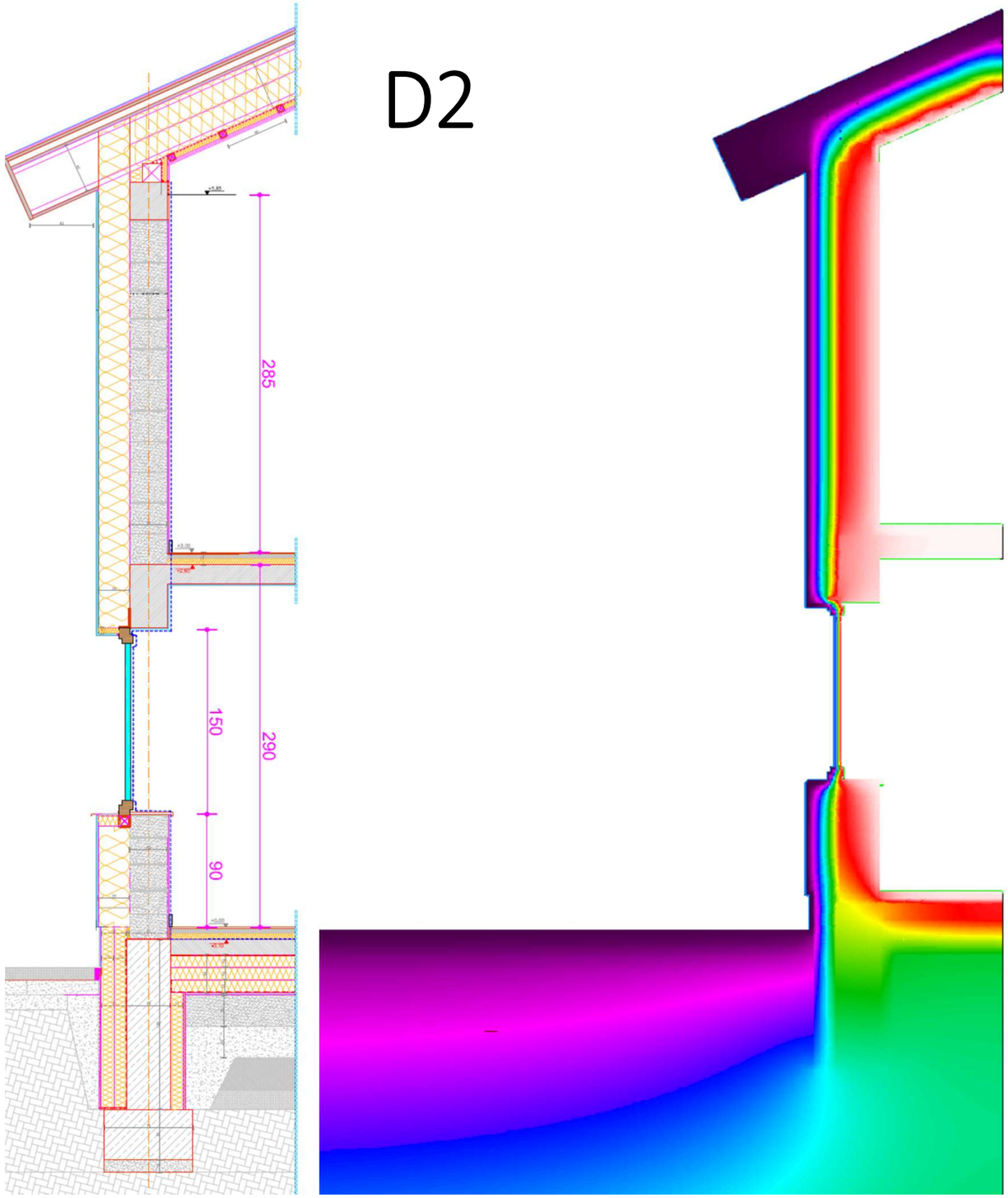
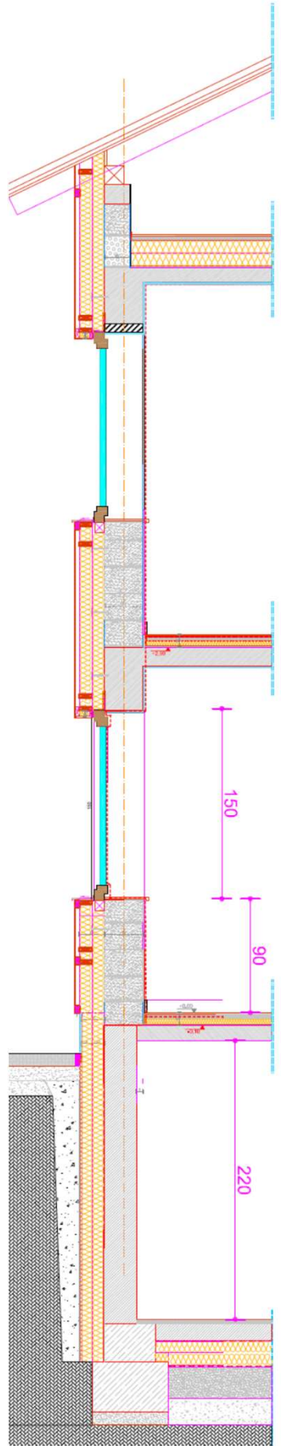
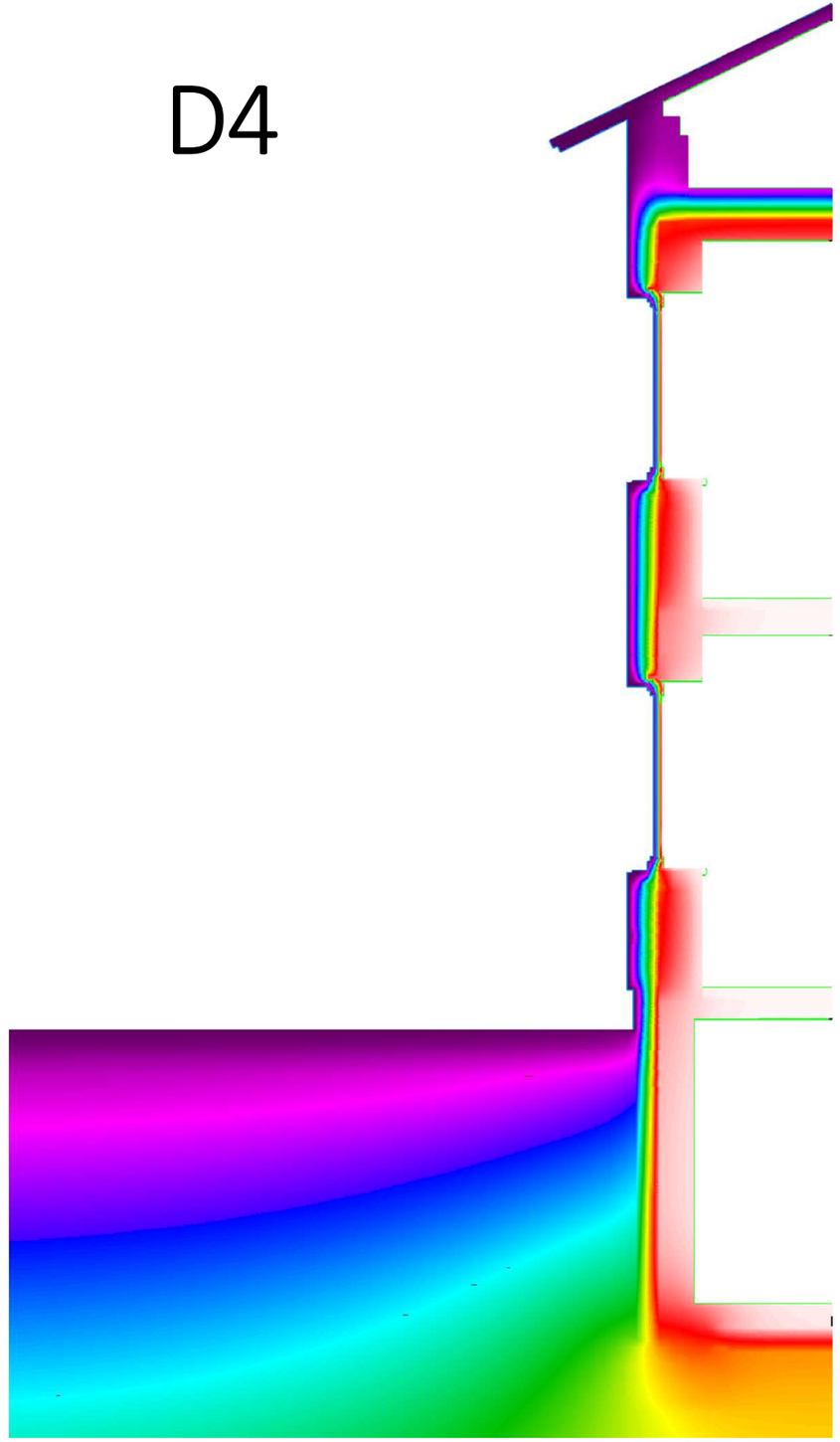
D2



D4





Improving details → nZEB (insulation – thermal bridges)

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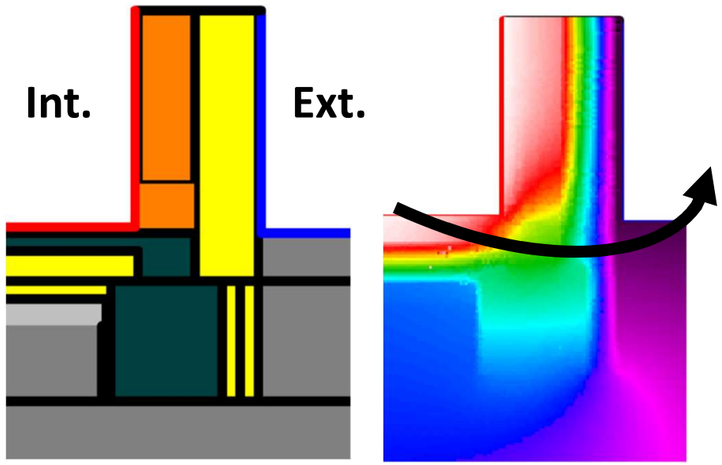
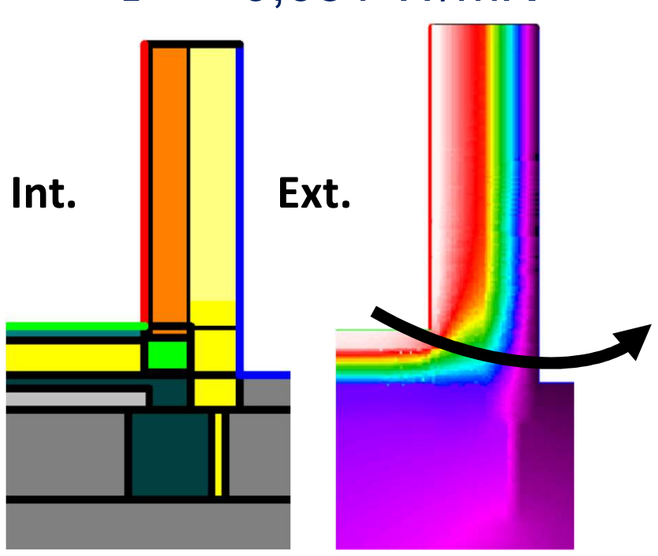
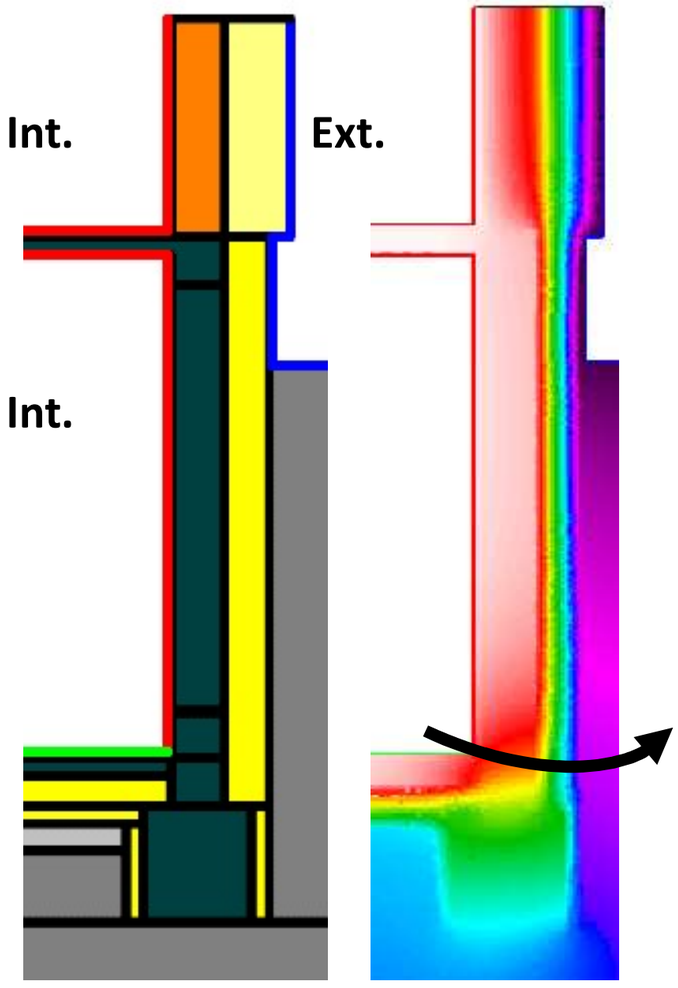
Ψ = 0,150 W/mK

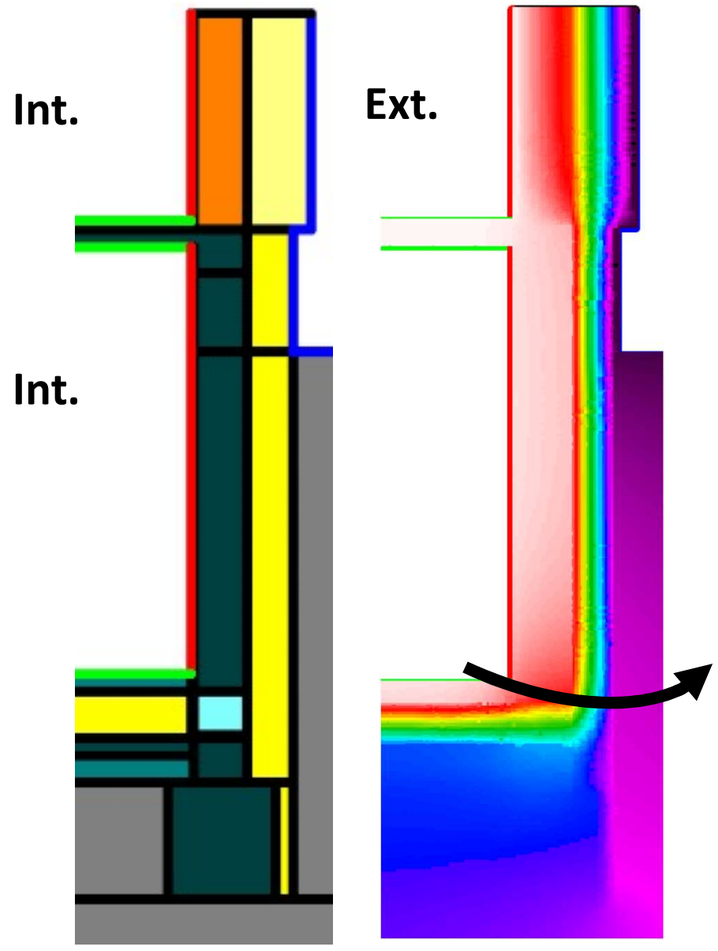


Ψ = - 0,031 W/mK





Ψ = 0,302 W/mK



Ψ = 0,073 W/mK

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www.train-to-nzeb.com

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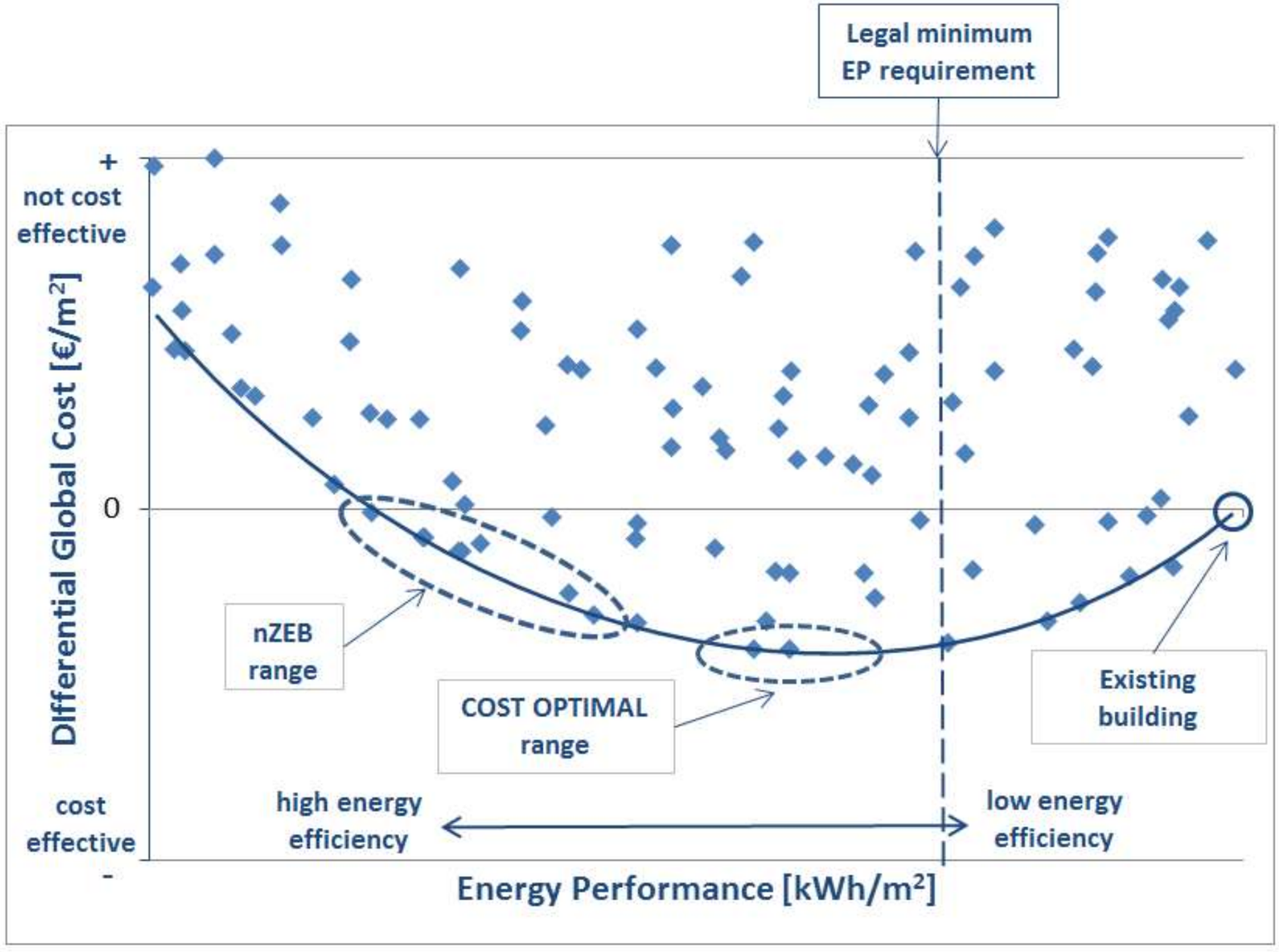
Costs optimization → nZEB definition (renovation)



Energy Performance (EP) = the building *global primary energy demand* divided by the *conditioned area*.

Global Cost (GC) = the net present value of all costs (ref. to the starting year), is linked to the calculation period (usually 30 years) and includes:

- investment costs for refurbishment;
- replacement costs;
- running annual costs.

The differential Global Cost (ΔGC) → extra-costs referred to a baseline building

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Case study – Office building → nZEB renovation

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nZEB1

- ☞ Ext. walls + 15cm EPS (ETICS)
- ☞ Terrace + 20cm EPX
- ☞ Slab on Basement + 6cm EPS
- ☞ Triple glazing, PVC
- ☞ District heating – compact station (H+DHW)
- ☞ PV System 45kW
- ☞ Climatic + Ambient
- ☞ Lighting LED + control

nZEB2

- ☞ Ext. walls + 15cm EPS (ETICS)
- ☞ Terrace + 20cm EPX
- ☞ Slab on Basement + 6cm EPS
- ☞ Triple glazing, PVC
- ☞ Condensing Boiler GAS
- ☞ PV System 45kW
- ☞ MV + heat recovery
- ☞ Climatic + Ambient
- ☞ Lighting LED + control

Current status

- ☞ External wall 1,55 W/m²K
- ☞ Terrace 1,29 W/m²K
- ☞ Slab on Basem. 2,98 W/m²K
- ☞ Windows 2,64 W/m²K
- ☞ District heating – central station (H+DHW)
- ☞ Cooling *Split* (part.) EER 2,5
- ☞ Natural Ventilation
- ☞ Centralised control heating
- ☞ Lighting mixt – manual

nZEB3

- ☞ Ext. walls + 15cm EPS (ETICS)
- ☞ Terrace + 20cm EPX
- ☞ Slab on Basement + 6cm EPS
- ☞ Triple glazing, PVC
- ☞ Biomass Boiler (H+DHW)
- ☞ MV + heat recovery
- ☞ PV System 45kW
- ☞ Climatic + Ambient
- ☞ Lighting LED + control

nZEB4

- ☞ Ext. walls + 15cm EPS (ETICS)
- ☞ Terrace + 20cm EPX
- ☞ Slab on Basement + 6cm EPS
- ☞ Triple glazing, PVC + shading
- ☞ Heat Pump air (combin.)
- ☞ MV + heat recovery
- ☞ Solar thermal system 10m²
- ☞ PV System 45kW
- ☞ Climatic + Ambient
- ☞ Lighting LED + control

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Costs optimization → nZEB definition (renovation)

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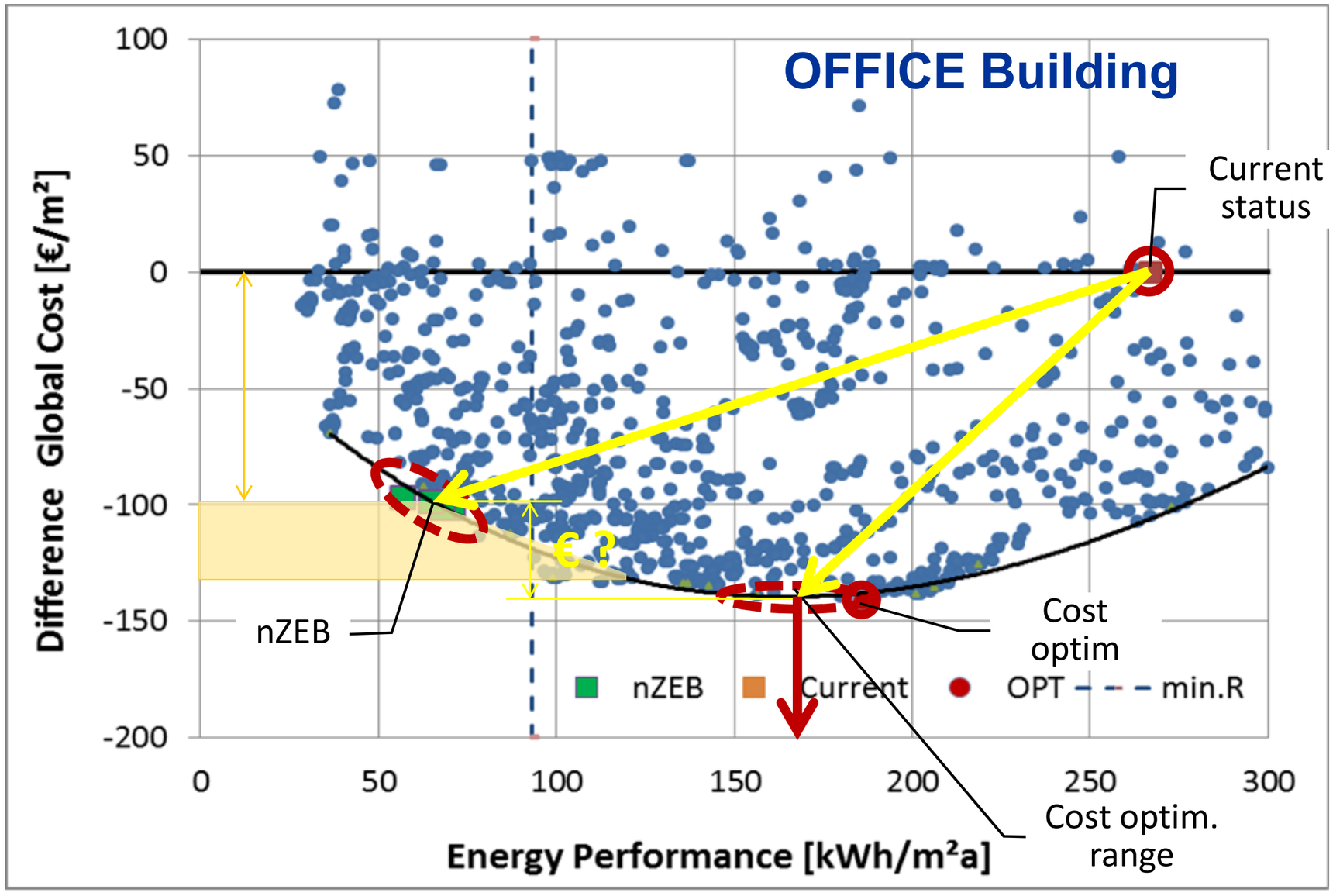

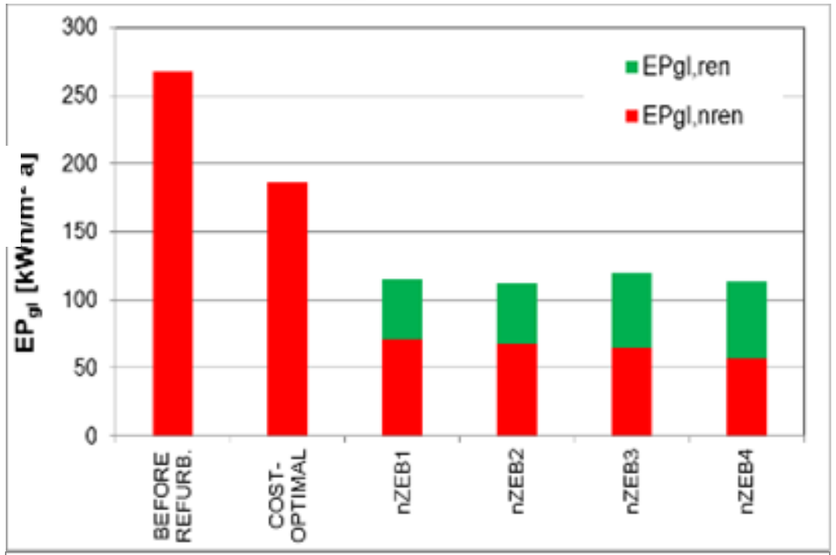

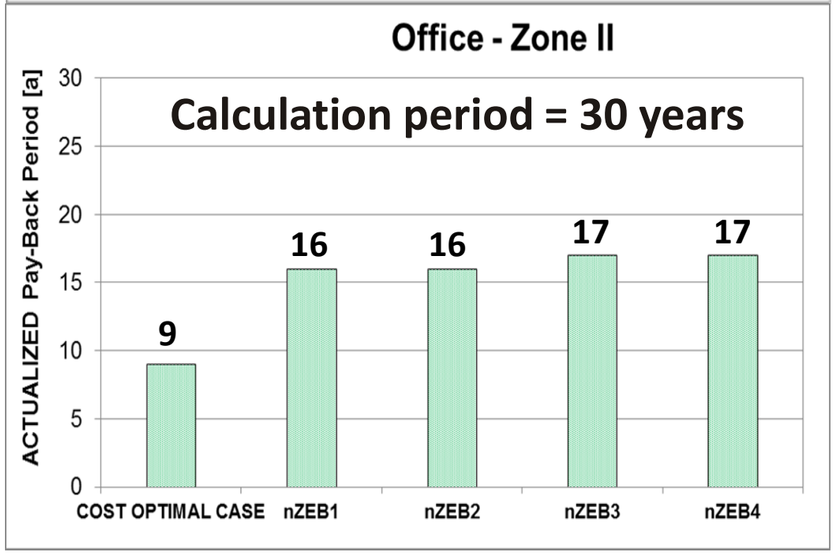

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What does require to be nZEB?

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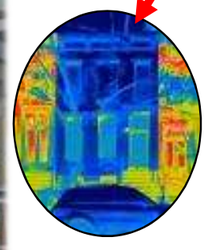
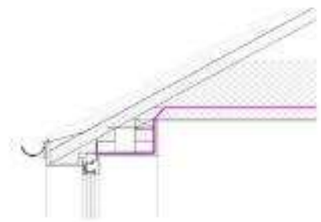
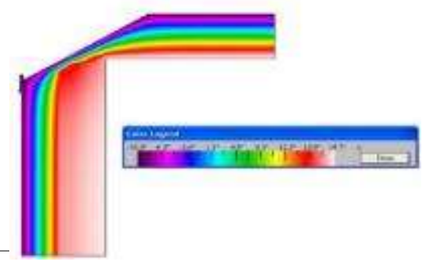
Airtight room + MV-HR

Constructive details (mock-ups)

IR Analysis (field)
Simulation (numerical)







Renewable energy sources

Foto: MosArt / Passive House Academy

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BDG Business Development Group

FPiP

Qualification vs Specialization

- **Qualification**

  – **Long duration (> 720 h)**
    - High costs
    - Reluctance to participate
  – **NQS Recognition**
    - National certification of qualifications / competences
  – **EQF Levels 2-4**
  – **Basic (+ cross) competences → single occupation**

- **Specialisation**

  – **Flexible duration (1-9 days)**
    - Reduced costs
    - Involvement availability
  – **NQS or Industry recognition**
    - Authorised programs,
    - Label develop. → trust build
  – **EQF 2-7**
  – **Already qualified → Additional Competences (nZEB) & cross-craft understanding**

- **Partnerships Education – Industry … BKHs, Cluster Pro-nZEB**

Introduction in Train-to-nZEB

Train-to-NZEB
The Building Knowledge Hubs

Building Knowledge Hubs – BKH

✓ **A HORIZON 2020 project: *Construction Skills* (EE-04-2014)**

✓ **Aim:** to establish a functioning network of **training and consultation centres** (Building Knowledge Hubs - **BKHs**), providing practical trainings, demonstrations and complex consulting services for the implementation of nearly-zero energy buildings (NZEB):

- enhanced capacity for conduction of trainings on curricula developed **BUILD UP Skills**
- trainings for highly-qualified **building professionals** and demonstrations for **non-specialists** with **decision-making authority**, for an **increased capacity for implementation of NZEB projects** in the involved countries.

✓ Duration **36 months (1 June 2015 – 31 May 2018)**.

✓ **Focus: 7 countries** (BG, CZ, DE, RO, IE, TR, UA) – 12 organiz.

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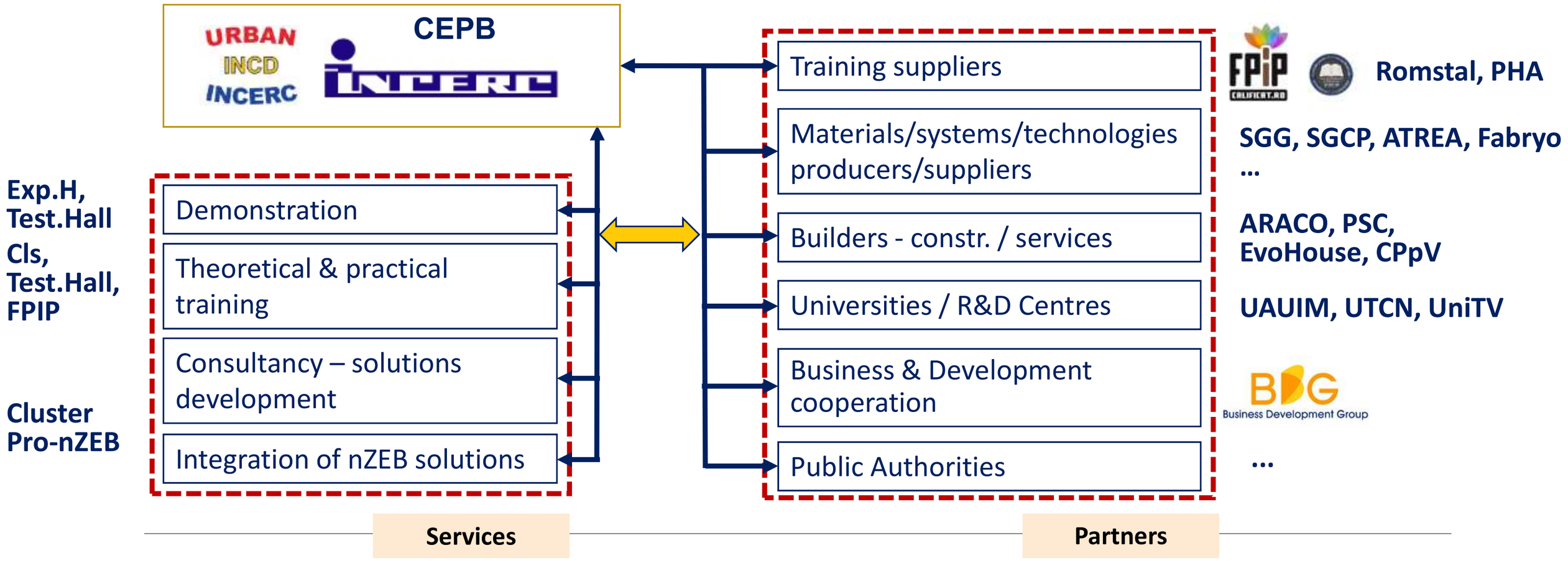
BKH Romania: General outline

- A **network organization** centered on the existing Centre for Energy Performance of Buildings within NIRD URBAN-INCERC
- During set-up and the inception phase additional **support will be provided by BDG, FPIP and other stakeholders identified and attracted within project duration**
- A new established not-for-profit entity ***Association Cluster PRO-nZEB*** **could take over executive management in subsequent stage**
- Main domains/activities: **training, consulting** & **research**
- Dedicate department for **promotion and market development**
- **Experts & trainers**: in-house and external
- **Course offer**: in-house and in partnership
- **Target groups:** as described in the following slides

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 649810

BKH Romania - Setting up



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Partnership Models

Model A: **Suppliers of building materials and solutions with EE/NZEB expertise/concerns**

Model B: **Organizations providing trainings for relevant occupations in the field of EE in buildings, green buildings and NZEB**

Model C: **Cooperation with partners active in EU projects connected with green, passive, NZEB concepts**

Model D: **Building companies with a concern for NZEB**

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Cluster Pro-nZEB

Aim

To develop a collaboration framework to implement technological concepts and specific projects for promoting nearly zero energy buildings in Romania

Key objective

Construction market – R&D (– public administration):

- **Initiation and performance of joined activities to define and implement of research and development projects for nZEB**
- **Creating the market conditions to ensure fulfilment of Romania's commitments for sustainable development and implementation of strategies for energy efficiency in the built environment**

→ January 2016 …

Conference "Way to nearly zero energy buildings"
2 March 2017, Prague

Founding members

URBAN INCD INCERC

INCERC

AAECR Asociația Auditorilor Energetici pentru Clădiri din România

SUNE

ARACO

PSC

PPTT

ETICS

BDG Business Development Group

Wienerberger

ISOVER SAINT-GOBAIN

SAINT-GOBAIN

fabryo-atlas

www.pro-nzeb.ro

BKH RO - Launching Event

Train-to-NZEB
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Conference "Way to nearly zero energy buildings"
2 March 2017, Prague

URBAN INCD INCERC
BDG Business Development Group
FPiP

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Technology and Innovative Solutions for NZEB Exhibition @ the BKH RO training center in Bucharest

11th of November 2016 - Conference @ INCD URBAN-INCERC BUCHAREST

- 67 participants representing all the target groups
- High potential and interest for cooperation with BKH RO

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BKH RO – implementation & Training Programs

- Arrangement of existing testing hall (Centre EPB) in Bucharest + Regional Centre in Brașov
- Design and realisation of airtight room + MVHR, mock-ups, samples and small systems …
- Training programs defined based on PH principles and nZEB definition – content …
- Bucharest: Start training programs with TTT and 1-2 programs (on-site workers, non-specialists →PH-Tp) – planned for March 2017 (1st TTT workshop 8-9 February 2017)
- Brașov: Photovoltaic panels installer training course (authorized NQS) - 7.5 weeks, 120 hours (68% practical training, certificate of electrician pre-required)

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URBAN INCD INCERC
Business Development Group
FPiP

BKH RO – Bucharest

BKH RO – Brașov









IF SKY IS THE LIMIT, THEN GO THERE.

PEB??
(positive)

ZEB?
(zero)

ALL NEW BUILDINGS!!

nZEB
(nearly zero)

Cost optimal requirements

- ☞ **Robust regulation**
- ☞ **Compliance**
- ☞ **Awareness**
- ☞ **Competences**
- ☞ **…**

Train-to-NZEB
The Building Knowledge Hubs

Thank you!

Horia Petran

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The Building Knowledge HUB Romania

BKH NZEB RO

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