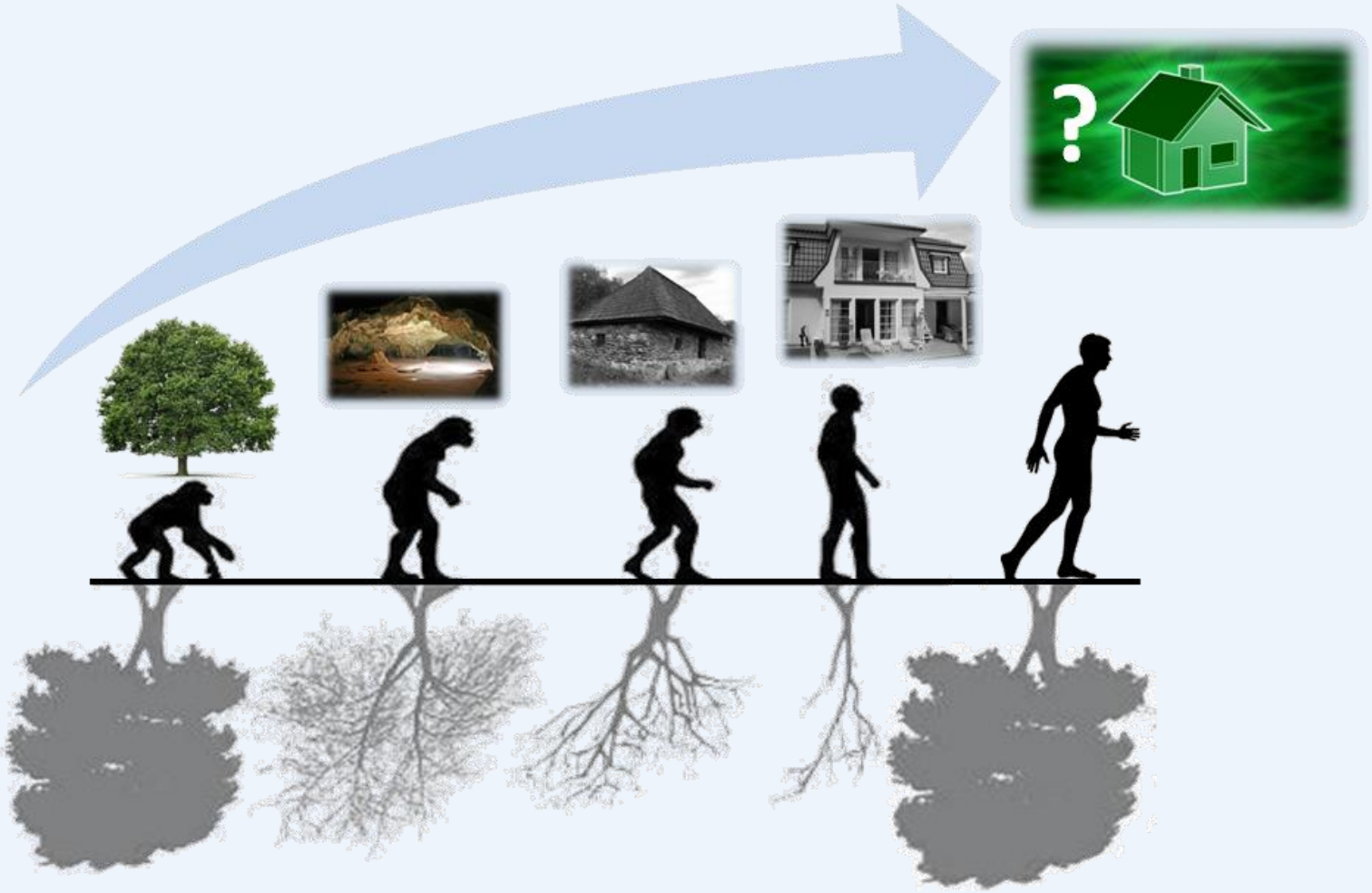
Sofia, September 2014

Overview of nZEB approaches in the EU MS



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nZEB: One EU requirement, 28 national implementation rules

EPBD2010
'nearly zero-energy building':

- very high energy performance
- very low amount of energy required (for HVAC, DHW, aux. equip. and lighting)
- covered to a very significant extent by energy from renewable sources, including on-site or nearby.

Implementation timeline:

- by 31 Dec. 2020, all new buildings
- after 31 Dec. 2018, new public buildings

EU MS to develop national plans for nZEB:

- National nZEB definition(s) in practice (incl. numeric indicator in kWh/m2/yr in primary energy)
- Intermediate target by 2015
- Incl. public buildings retrofit towards nZEB levels
- Incl. info on policies and measures and RES requirements in new and existing bildings.

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Status of nZEB implementation in the EU

- **Summer 2014**: 18 out of 28 MS reported to the EU Commission. The national approaches vary largely

- around 5 MS reported officially assumed nZEB definitions incl. a numerical target (i.e. Dk, Lt, Be-Brx Region, Fr, Sk)

- in most of the cases the nZEB national definition is under development, or not yet enforced by legislation

- Many nZEB levels based on cost-optimal values

- the nZEB targets (2015 and 2020) are expressed/set as:
  - Minimum energy performance requirements (e.g. Be-Brx, Cy, Dk)
  - Required energy label in EPCs (e.g. Sk, Lt)
  - In many cases associated with RES requirements (e.g. Fr, Cy)
  - In some cases expressed in carbon terms (e.g. UK and Ie having both energy and carbon)

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nZEB in Belgium-Brussels Region

- In 2011 - amended EPB Ordinance tightening requirements from January 2015 onwards
- Energy scope of nZEB: EPBD energy scope
- **Ongoing plan to support the uptake of future requirement**

- **nZEB definition/Minimum requirements from 2015:**
  - residential buildings:
    - primary energy consumption below 45kWh/m2/yr and
    - heating need below 15kWh/m2/yr.
  - office and education buildings:
    - primary energy consumption below (90-2.5*C) kWh/m2/yr and
    - heating need below 15kWh/m2/yr and cooling need below 15kWh/m2/yr

    (C=Volume/area)

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nZEB in Cyprus

- Based on cost-optimal calculation, subject to public consultation
- Energy scope of nZEB: ~EPBD energy scope (heating, cooling, DHW, lighting)

- **nZEB definition and pathway:**
  - Residential Buildings:

    Primary Energy Use < 180kWh/m2/yr and

    At least 25% of the primary energy must be covered by RES.

    Primary energy use for heating, cooling, lighting and domestic hot water.
  - Non-Residential Buildings (mainly offices):

    Primary Energy Use < 210kWh/m2/yr and

    At least 25% of the primary energy must be covered by RES.

- Specific technical characteristics for each building category and climate zone
- Implementation plan in three steps with preparatory actions y 2015, gradual implementation by 2018 and full application by 2020

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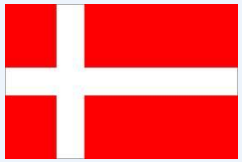

nZEB in Denmark

- Set-up clear nZEB definition and roadmap by 2020 based on a wide political agreement in the Danish Parliament
- Energy scope of nZEB: EPBD energy scope (i.e. heating, cooling, DHW, ventilation, lighting for non-residential)

- **nZEB definition and pathway:**

		BR2010 [kWh/m2/yr]	2015 [kWh/m2/yr]	2020 [kWh/m2/yr]
Minimum requirements	Residential buildings	52.5 + 1650/A*	30 + 1000/A	20
	Non-residential buildings	71.3 + 1650/A	41 + 1000/A	25
Primary energy factors	Electricity	2.5	2.5	1.8
	District heating	1.0	0.8	0.6

A=the heated gross floor area

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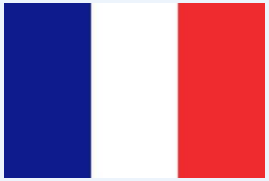

nZEB in France

- First Grenelle de l'Environment Law recommends more ambitious requirements for new buildings
- Energy scope of nZEB: EPBD energy scope

- nZEB definition:
  - Already from 2011/2013 –in force RT 2012 standard (for non-residential and residential buildings): 50kWh/m2/yr, varying between 40-65 kWh/m2/yr according to climate and altitude
  - RT2012 is three times stricter than prior regulation (RT 2005: 150kWh/m2/yr)
  - RT2012 - 3 main requirements on: energy performance, on energy consumption and on summer comfort
  - RES consideration into RT2012: residential buildings have to opt between one of below alternatives:
    - Solar-thermal DHW
    - Connexion to a DH system with more than 50% RES
    - To demonstrate that RES contribution to building's energy consumption is ≥ 5kWh/m²/yr (primary energy)

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nZEB in Lithuania

- Construction Technical Regulation STR 2.01.09:2012
- Energy scope of nZEB: EPBD energy scope

- **nZEB definition**: have to comply with class A++ energy performance, i.e. minimum requirements for:
  - primary non-RES energy for heating, cooling, ventilation, lighting (C1<0.25) and for primary non-RES energy for DHW (C2≤0.70)
  - specific heat losses, air-tightness and air circulation, efficiency of heat recovery systems
  - RES share >50%

- **Pathway to nZEB:**

Before 2014	2014	2016	2018	2021
energy class C	energy class B	energy class A	energy class A+	energy class A++

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nZEB in Slovak Republic

- Act No 300/2012 amending Act No 555/2005 on the energy performance of buildings, STN 73 0540-2: 2012 Thermal protection of buildings
- Energy scope of nZEB: EPBD energy scope

- nZEB definition: energy class A0 on EPCs from 2021 (and 2019 for public)
- **Pathway to nZEB:**

	Category of building	Jan 2021	Jan 2015	Jan 2013	Building energy performance classes				
		A0	A1	B	C	V	E	F	G
Global indicator – primary energy	Single-family houses	≤ 54	55-108	109-216	217-324	325-432	433-540	541-648	> 648
	Apartment blocks	≤ 32	33-63	64-126	127-189	190-252	253-315	316-378	> 378
	Office buildings	≤ 60	61-120	121-240	241-360	361-480	481-600	601-720	> 720
	School and educational facility buildings	≤ 34	35-68	69-136	137-204	205-272	273-340	341-408	> 408
	Hospital buildings	≤ 96	97-192	193-384	385-576	577-769	770-961	962-1153	> 1153
	Hotel and restaurant buildings	≤ 82	83-16	165-328	329-492	493-656	657-820	821-984	> 984
	Sports halls and other buildings for sport	≤ 38	39-76	77-152	153-258	259-304	305-380	381-456	> 456
	Wholesale and retail trade services buildings	≤ 85	86-170	171-340	341-510	511-680	681-850	851-1020	> 1020

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nZEB in Ireland

- Subject of cost-optimal calculation
- Energy scope of nZEB: ~EPBD energy scope (space heating, water heating, fixed lighting and ventilation)

- **Pathway to nZEB:**
  - For dwellings:

Low Energy Dwelling with Solar Thermal DWH	
Primary Energy (kWh/m^2/yr)	45
CO_2 Emissions (kg/m^2/yr)	10
EPC	0.302
CPC	0.305

  - For non-dwellings:

40% overall reduction by 2014 and 60% reduction by 2020 (as comparing to 2008 levels)

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nZEB in the United Kingdom

- **Slightly different approach, i.e. focus on carbon emissions**
- Not yet officially committed in buildings regulations
- EPBD energy scope
- Among others, it is discussed how investments in off-site renewable energy ("allowable solutions") can be taken into account in the nZEB balance

- Aims: (nearly) Zero Carbon Buildings by 2016 for new residential and by 2019 for all non-residential buildings

- Residential builldings: Based on "Code for Sustainable Homes (CSH)" (step 5)
    - 10 kg CO2/m²/year for detached houses or ~46 kWh/m2/yr
    - 11 kg CO2 /m²/year for attached houses or ~46 kWh/m2/yr
    - 14 kg CO2 /m²/year for low rise apartment blocks or ~39 kWh/m2/yr

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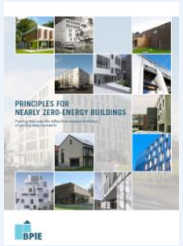
nZEB in Bulgaria

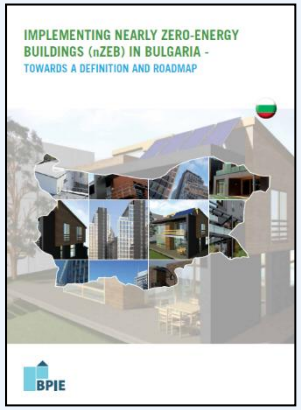
- Indicative proposal, according to the proposed plan should be officially assumed in 2014(?)
- EPBD energy scope



- nZEB definition following the nZEB principles from BPIE (2011)

BUILDING GROUPS	REQUIREMENTS FOR MEETING NEARLY ZERO-EMISSIONS STANDARDS
GROUP A: Single and multi-occupancy residential buildings with a floor area of up to 500 m^2	1. To achieve class A primary energy consumption, whereby: 2. At least 50 % of the energy needed for heating, hot water, ventilation and cooling is from renewables.
GROUP B: Buildings with a floor space of 500 to 7 000 m^2: - residential buildings, halls of residence, rest houses, multi-function buildings, public buildings for education, and science, culture, social services, administration, commerce, public catering and hotels, buildings for domestic services, public service buildings for transport and electronic communications, sports, ceremonial buildings, congress and conference centres, and health establishments.	1. To achieve class A primary energy consumption, whereby: 2. At least 30 % of the energy needed for heating, hot water, ventilation and cooling is from renewables. 3. The share of electricity in the building's annual primary energy consumption balance (including electricity for the heating, hot water, ventilation and cooling systems) is no more than 30 %.
GROUP C: Buildings with a floor space of more than 7 000 m^2: – residential buildings, halls of residence, rest houses, multi-function buildings, public buildings for education and science, culture, social services, administration, commerce, public catering and hotels, buildings for domestic services, public service buildings for transport and electronic communications, sports, ceremonial buildings, congress and conference centres, and health establishments.	1. To achieve class A primary energy consumption, whereby: 2. At least 20 % of the energy needed for heating, hot water, ventilation and cooling is from renewables. 3. The share of electricity in the building's annual primary energy consumption balance (including electricity for the heating, hot water, ventilation and cooling systems) is no more than 40 %.

BPIE study for nZEB in Bulgaria



Available at: www.bpie.eu

Project team: BPIE, ECOFYS GmbH, EnEffect

Aims:

- To provide potential nZEB definitions based on a cost-optimal valuation and following the principles for nZEB from BPIE (2011).
- To evaluate the current status and propose possible policy implementation roadmap for nZEB

- Potential nZEB definitions in Bulgaria:

Building type	Minimum requirements	Year		
		2015/2016	2019	2020
Single family buildings	Primary energy [kWh/m²/yr]	60-70		30-50
	Renewable share [%]	>20		>40
	CO_2 emissions [$kgCO_2/m^2/yr$][14]	<8		<3-5
Multi-family buildings	Primary energy [kWh/m²/yr]	60-70		30-50
	Renewable share [%]	>20		>40
	CO_2 emissions [$kgCO_2/m^2/yr$][15]	<8		<3-5
Office buildings	Primary energy [kWh/m²/yr]	100		60-80
	Renewable share [%]	>20		>40
	CO_2 emissions [$kgCO_2/m^2/yr$][16]	<15		<8-10
Public office buildings (exemplary role)	Primary energy [kWh/m²/yr]	100	40-60	
	Renewable share [%]	>20	>50	
	CO_2 emissions [$kgCO_2/m^2/yr$][17]	<12	<5-8	

Roadmap to nZEB

- **Policies: Strategic long term planning,** holistic policy packages, able to mobilise and upscale the low-energy building markets.
- **Dynamic regulations; nZEB for both new buildings and major renovations**
- **Info and awareness**: More info and awareness with demo/pilot projects, one-stop-shop, promotion of top runners, market facilitators, best practice exchange etc. May be necessary to **re-scale/adapt the EPCs** according to nZEB levels!
- **Quality counts! Training workforce, stricter enforcement of regulations, higher compliance**
- **nZEB definitions for (major) renovation** of existing buildings
- **Support programmes** to secure transition and market upscale

Half measures make any market transformation process longer and ineffective!

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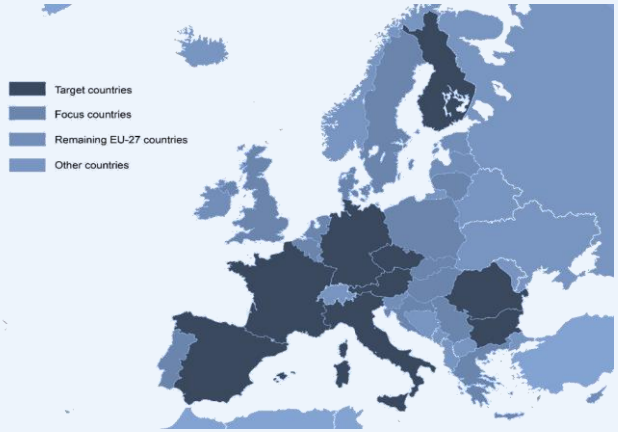
PROMO

ENTRA NZE

Co-funded by the Intelligent Energy Europe Programme of the European Union

IEE Project ENTRANZE: Policies to enforce the transition to nZEB in the EU



- Duration: Apr 2012-Sept 2014
- 10 partners from 9 countries
- Database on building stock
- Analysis of policies and behavior
- Cost/energy curves for cost-optimal nZEB renovation
- Define integrated policy packages
- Scenario 2020/2030, roadmaps and recommendations
- Close coop. with policy makers and stakeholders

- nZEB renovation defined on three levels, including C-O renovation and two other energy performance levels (based on the 'nZEB radar' concept developed in the IEE project COHERENO , www.cohereno.eu)

Preliminary results:

- With ambitious nZEB policies, an increase of the ‚nZEB renovation rate' to more than 1% in 2020-2030 can be achieved (with significant differences among countries)
- This may lead to a reduction of final energy demand of about 40% until 2030 (compared to 2008).

More info at: www.entranze.eu

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Final remarks

- Many nZEB plans are not clearly defined, nor comprehensive, some showing only intentions or unclear commitments to further implement it. Only few countries set targets and clear measures for nZEB renovation (e.g. Be-Brx, Nl, Dk, Fr).

- However time is running, 2015 (intermediate nZEB target) in 3 months!

- Many of nZEB definitions are in line with cost-optimal levels.
  Is this BaU? Is it possible more?

- Some EU MS already implement or committed to ambitious nZEB levels and act vigorously. Good practice: Be-Brx.

- For some other EU MS to be ambitious is but a big challenge of transforming the actual practice almost radically and in short.

- **nZEB should be a paradigm shift from component-based to systemic approach!** This lead to a major change of practices at market level which have to be properly prepared with appropriate policies.

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Technology is already available, are the nZEB plans able to transform buildings markets?

Yes, we can! But for reaching a real transformation of buildings sector there is a need for…

…strong commitment at policy making and market levels,

…long-term planning and vigorous implementation

…**innovation** in all
policy making process,
market actions and
raising general interest
for better buildings

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“You never change things by fighting the existing reality.

To change something, build a new model that makes the existing model obsolete.”

Richard Buckminster Fuller
(1895 – 1983)
American architect, system theorist, designer, inventor

Thank you!