



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



nZEB in Italy: monitoring actual spread and technologies

PrioritEE Final Conference

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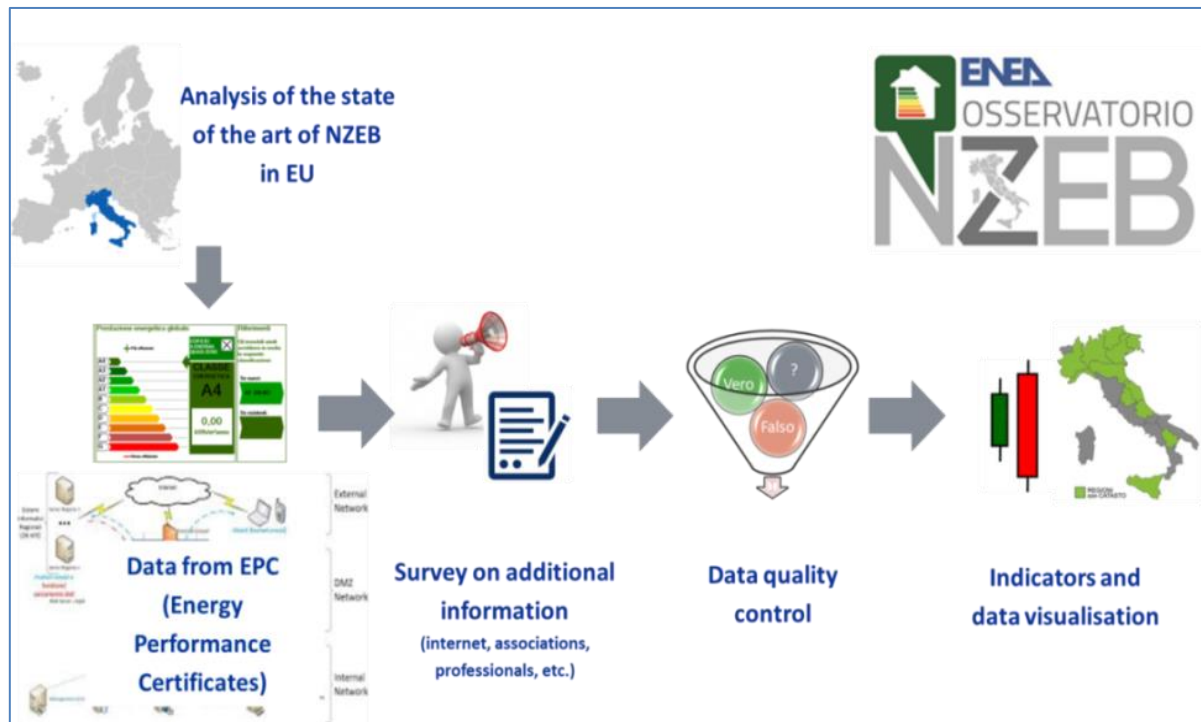
Why a «nZEB Observatory»

Monitoring nZEB to comply with [European Union](#) and Italian regulation and targets
Funded by RdS - Ministry of Economic Development

- Which incentivising **measures** and what impact?
- **How many** nZEBs and what difference along with climate, type, use?
- Which **technologies** are commonly used?
- Is **data** available to support decision and drive the nZEB market?



The Methodology



- nZEB: Italy in UE
- Collection and processing of regional EPC data
- Collection of further data
- Development of key indicators
- Creation of a database
- Selection of Best Practice

Measures promoting nZEBs in Italy (2016-2018) 1/2

- **2015 EPBD implementation decree:** EP standards are stricter by 15%. Growing requirements for RES share. From January 2019, new or deeply renovated public buildings are to be nZEB
- **Conto termico national incentive (measure 1.E):** co-funded 44 Public buildings renovated to nZEBs so far. Number of renovations to nZEBs increased by 430% from 2017 (28) to 2018 (120).
- **POR FESR 2014-2020 financial incentive:** More than 100 public buildings renovation to nZEB funded in 5 regions in the last 2 years
- **POR FESR 2014-2020 for social Housing:** nZEB demo within urban regeneration (Piedmont, Veneto, Emilia Romagna, Tuscany, ...)
- **Sblocco Patto Comuni, Kyoto Fund, Sbocca Scuole and Nuove scuole innovative** decrees resulted in some public nZEBs (even if the were not aiming that level).*



Research and Innovation:

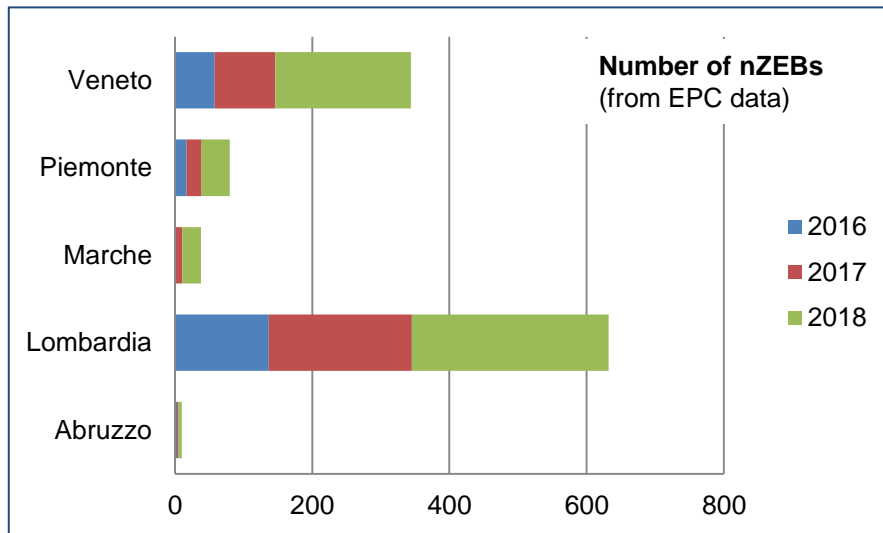
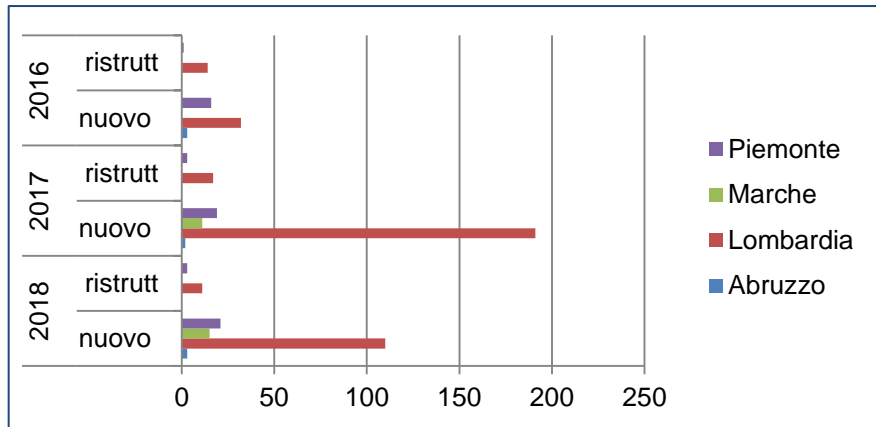
- Focus on cost reduction but results in terms of paybacks and investments are extremely contradictory ([CONZEBs](#), [CRAVEzero](#), [A-ZEB](#), [Renew-School](#))
- Demonstration and pilot projects are not financed by national programmes

Skills and awareness raising:

- Number of initiatives at local level but a common national orientation is missing
- Italian partners in EU projects started drafting harmonised qualification/training requirements in the European common framework of qualification (EQFLL_ECTS). ([BRICKS](#), [iTown](#), [Prof-Trac](#), [MEnS](#), [Fit2NZEB](#))
- Awareness raising and dissemination of best practice is rather fragmented

Spread of nZEBs in Italy

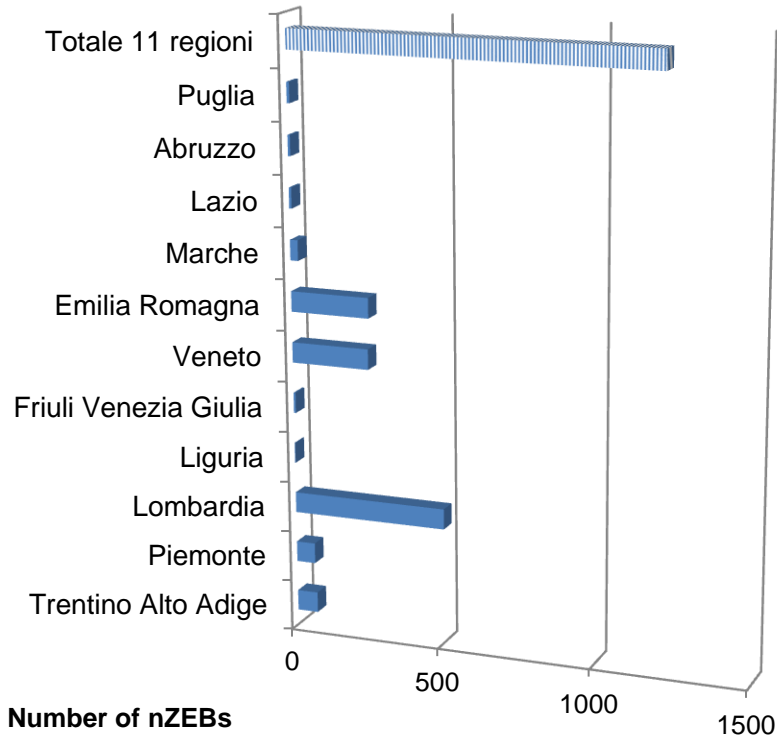
- **Around 1400 NZEBs**, (A3)-A4 Class, mostly new (90%) and residential (85%)
- **Increasing trend**, not only were nZEBs are already mandatory (Lombardy)
- **Public nZEBs** hard to detect from EPC



Accuracy of the analysis:
 Detailed for 5 regions; trustable data available for 6 more regions, estimation for remaining regions*

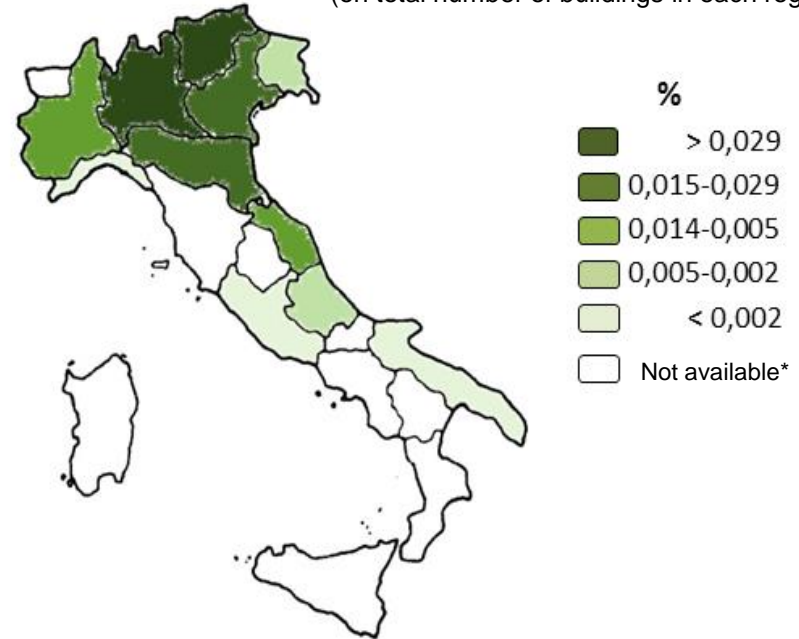
Spread of nZEBs in Italy

(January 2016 - June 2018)



Percentage of nZEBs

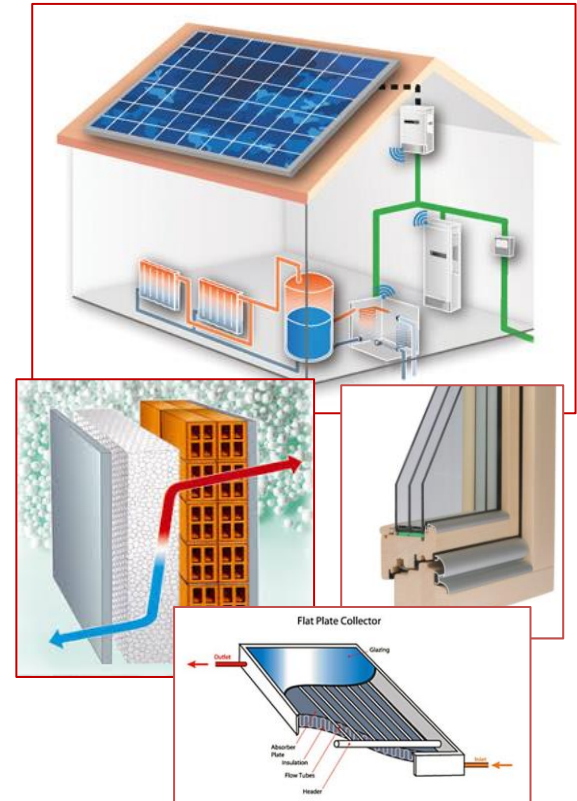
(on total number of buildings in each region)



Technologies of the Italian nZEBs

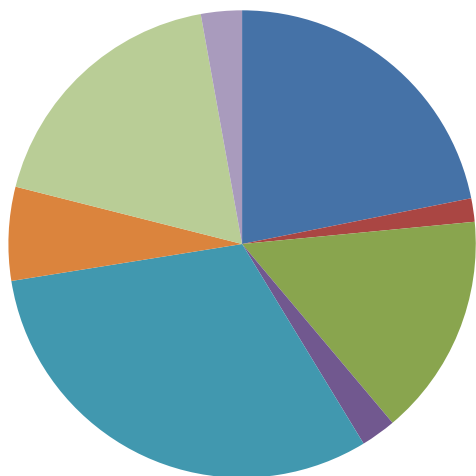
Limited variety of technologies monitored

- Envelope insulation (EPS, mineral wool), 2-3 glaze
- Recurrent wood structure/envelope and passive syst.
- Single technical system for H/C and DHW:
 - Electric Heat Pumps (HP, air-water mostly) coupled to a Photovoltaic (PV) Power plant (60%)
 - or: HP supported by a condensing boiler and by solar thermal (ST) panels for domestic hot water
- Controlled mechanical ventilation with heat recovery (50% residential buildings, 80% non residential b.)
- Low use of District Heating and Biomass (1-5%)

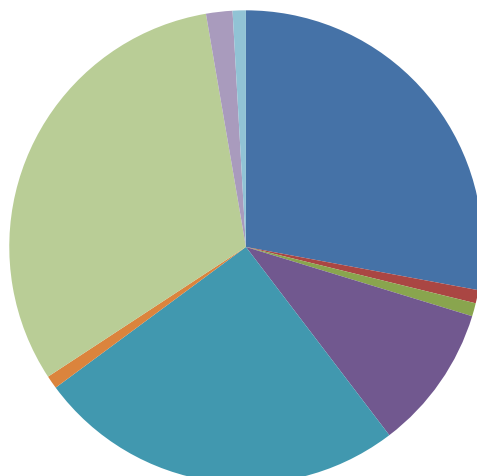


HAVC technologies of the Italian nZEBs

Residential buildings



Non-residential buildings



- Air to water Heat Pump (HP)
- Air to air Heat Pump (HP)
- Condensing Boiler
- Solar Thermal for DHW
- PV system
- Gas air to water HP
- Gas air-to air HP
- Gas air-to air HP
- Mechanical Ventilation
- Biomass
- Hybrid systems

Source:
Regional EPC
databases of
Lombardy,
Piedmont,
Marches,
Abruzzo

Reference
period:
January 2016 to
30 June 2018

Building Technical Systems in **NZEB** (Climatic zone D to F, mostly E)
Low influence of climatic zone on TBS use

Technologies and energy performance of nZEBs

41 selected case studies (24% public non-residential b.)

- **Building automation and control systems** applied on HVAC and lighting are present in $\frac{1}{4}$ of the sample
- **Envelope Energy Performance** quite independent from climatic zone and even from b. type and use $U_{\text{wall}} = 0,17- 0,19 \text{ W/m}^2\text{K}$; $U_{\text{roof}} = 0,15-0,21 \text{ W/m}^2\text{K}$; $U_{\text{glass}} = 0,6-1,4 \text{ W/m}^2\text{K}$ (decreasing from E to D zone)
- **EP_{gl,nren}** average for new nZEBs: 47 kWh/m²a (F-D)
12 Net zero energy (EP_{gl,nren} <10), 2 are public b.
- **Cost:** 1.100 - 1.600 euro/m² (double in small isolated buildings). Renovation cost lower than previewed.



School "Italo Calvino, Lombardy



- Municipality **Novate Milanese**
- Climatic zone E, DD 2.404

BUILDING ENERGY PERFORMANCE	
EP _{gl} (kWh/m ² a)	20
EP _{gl,nren} , kWh/(m ² a)	3
RES share	85%
Energy Class	A4
ENVELOPE	
S/V	0,43
H _T (W/m ² K)	0,142
Wood structure (Third-party forest certification)	
U – values (W/m ² K) (Opaque envelope)	U _{wallr} =0,154 U _{roof} =0,133 U _{floor} =0,187
Windows: double glazed , PVC frame	
U – values (W/m ² K) (windows)	U _g =1,1 U _w =1,2

TECHNICAL BUILDING SYSTEMS	
Space heating	
Type	Electric heat pump (air to air)
Notes	86,53 kW - COP = n.d.
Space cooling	
Type	Electric heat pump (air to air)
	77,76 kW - EER = 10,83
Domestic Hot Water	
Type	Electric Heat Pump
	Power = 2,16 kW.
PV Photovoltaic	
Power	Mono cristall 46,50 kW peak

Yard duration: start 07/2016, end : 09/2017

Construction: Wolf Haus, Bozen

Cost: 2.850.000 €; 1.295 €/m²

Public funding: [#SbloccaScuole 2016](#)

Other public nZEBs



New Kindergarden, Bisceglie (Apulia): urban regeneration. High inertial envelope. Heating served by air to water HP coupled to PV. Sun shadings. BACS. A4 class
 $EP_{gl,nren} = 17 \text{ kWh/m}^2\text{a}$



School Renovation, Sant'Anatolia di Narco (Umbria): envelope insulation, re-lamping, new air to water HP coupled to PV for H. and DHW. From E to A3 (nZEB) energy class. $EP_{gl,nren} = 16 \text{ kWh/m}^2\text{a}$
Cost: 396 €/m²



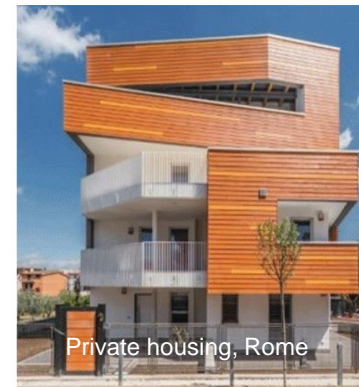
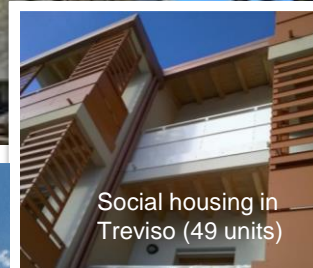
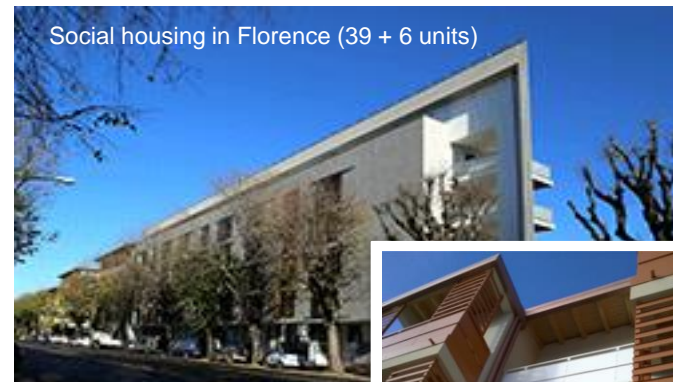
School Renovation, Vimercate (Lombardy): Envelope insulation, New air to water HP coupled to PV (supported by condensing boiler). New windows and LEDs BACS. $EP_{gl,nren} = 32 \text{ kWh/m}^2\text{a}$
A4 class RES: 73%
Cost: 394 €/m²



Re-construction of the Municipal Office b., Gabicce (Marches): Wooden frame and envelope. Sun shading. H/C served by air to air HP coupled to PV. Mechanical ventilation. LED for lighting. BACS. A4 class $EP_{gl,nren} = 43 \text{ kWh/m}^2\text{a}$
Cost: 1.451 €/m²

Conclusions

- 10% of nZEBs are deeply renovated buildings, % of the stock with 2 decimal places (school buildings: 20 times that rate)
- Multi-residential NZEB and public buildings “renovations” generally achieved through “reconstruction” (energy saving: up to 80% compared to the original, depending of climate)
- Data availability and integration needed (SIAPE, incentives, cohesion funds, ...)
- Demo, skills, control measures needed
- Future holistic approach to district and mobility!



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Open access report: [*Osservatorio degli edifici a energia quasi zero \(nZEB\) in Italia – 2016-2018*](#)