



The neZEH Project

Flagship projects and tools for hoteliers

Stavroula Tournaki
Technical University of Crete

Final Dissemination Event
21 February 2017, Brussels

step by step
renovation
towards nearly
zero energy
SPORT buildings



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www.nezeh.eu

NEARLY ZERO ENERGY HOTELS IN EUROPE

The neZEH project insights

Stavroula Tournaki

Technical University of Crete, neZEH Project Coordinator



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- Tourism 3rd largest industry in EU
- 200.000+ establishments
- 9,7 million jobs
- 600+ million tourist arrivals.

1% of total **CO₂** emissions globally is from hotels

160 – 200 kg CO₂ / m²

Hotels may save up to

70% of their energy consumption



Hoteliers business challenges



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- ▶ Reduction of operational and maintenance cost
- ▶ Energy security
- ▶ Market and guests expectations-Competitiveness
- ▶ Regulatory-legislative changes
- ▶ Funding opportunities for renovation
- ▶ Climate change - Environmental footprint – Social Responsibility



▶ Sustainability



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The European Initiative Nearly Zero Energy Hotels



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To accelerate the rate of refurbishment of existing hotels into Nearly Zero Energy Buildings (nZEBs):

- providing **technical advice** to hoteliers for nZEB renovations
- challenging further large scale renovations through **capacity building activities and policy recommendations**
- **showcasing best practices** demonstrating the competitive advantages and sustainability of nZEB projects
- and **promoting front runners.**





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PROJECT COORDINATOR



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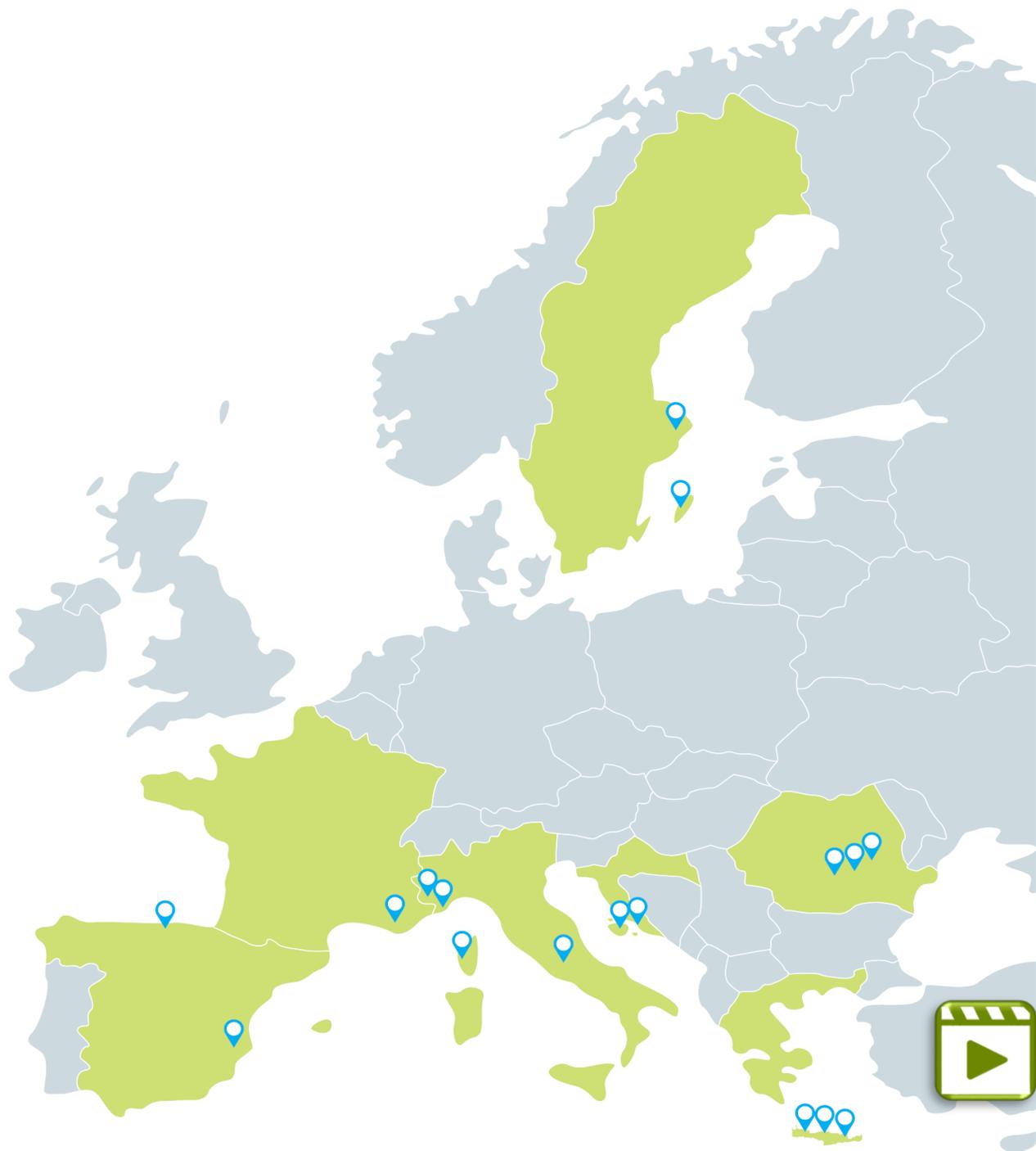




7 EU countries

16 neZEH hotels

4 neZEH hotels awarded





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THE neZEH Approach



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What is a neZEH hotel



A nearly Zero-Energy Hotel (neZEH) is a hotel that has a very high energy performance. The nearly zero or very low amount of energy required should be covered to a very significant extent from renewable sources, including energy from renewable sources produced on-site or nearby.

Following the EPBD recast

neZEH targets: country specific benchmarks which constituted by a **primary energy indicator** (kWh/m²/y) and a **RES Ratio** (%), including benchmarks for refurbished buildings



Hotels are not typical buildings



Hosting functions

- Guests' rooms
- Reception hall
- Offices
- Bar
- Restaurant
- Meeting rooms



Typical use of the building,
as suggested by the EPBD

Non-hosting functions

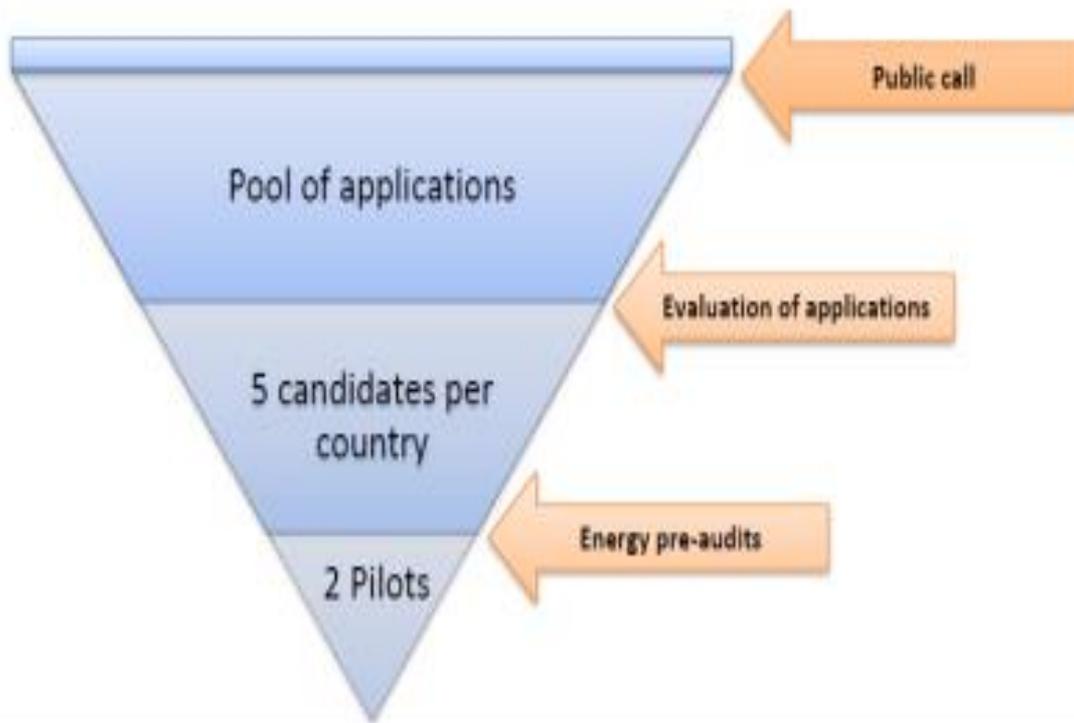
- Spas
- Swimming pools
- Saunas
- Gym
- Kitchens
- Laundry etc.



Calculated separately in order to
provide recommendations for dealing
with hotel building complexities



Selection of neZEH Pilot Hotels



1. Open call, reached 4.000 → **85 applications**
2. Evaluation of applications using a set of criteria → initial selection of **40 hotels**
3. Energy pre-audits, to initially assess their potential and capability of reaching nZE target → **2-3 pilot hotels per country**

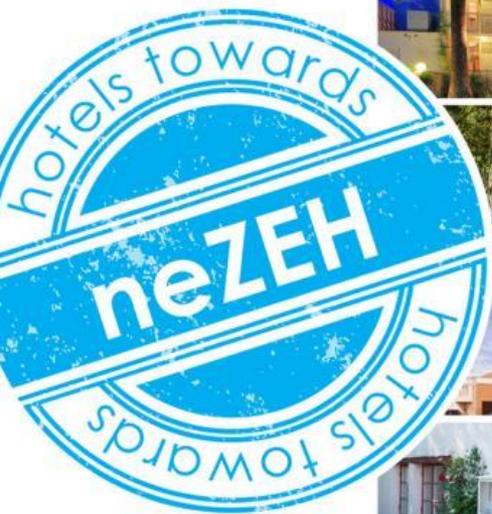


16 neZEH frontrunners

At the energy forefront of the European Accommodation Industry



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16 hotels across 7 countries follow large-scale renovation plans to become nearly Zero Energy Hotel frontrunners and serve as examples of best practice



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Resort

COASTAL

RURAL

Spa/Wellness

URBAN

Business

MOUNTAIN

B&B



neZEH value proposition to pilot hotels



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✓ Energy audit

- to assess the current energy status, prioritize appropriate energy efficiency and RE measures

✓ Feasibility study

- to develop feasible renovation scenarios and serve as a decision document for hotel owners
- to identify possible funding sources and produce a rollout plan for renovation

✓ Tender preparation, selection of contractors and monitoring

- to identify suitable funding solutions and proper ways of contracting e.g. through EPC
- to advise hotel owners on how to monitor all phases of the project implementation

✓ Training of hotel management and staff

- to achieve maximum efficiency and best use of the solutions found for the pilot project

✓ Marketing tools

- to help hotel owners build a communication strategy that will highlight the benefits of staying in a neZEH hotel and help them reach to potential guests

✓ Promotion and increased market visibility at national and EU/International level



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Four steps towards a nearly Zero Energy Hotel!

1

Assess your hotel's energy performance and identify actions needed to achieve nearly zero energy status.

Use the neZEH Energy Solutions Toolkit.

2

Develop your business plan and specify the most suitable energy efficiency solutions and renewable energy technologies for your hotel. Identify financial instruments available at national and EU level.

*Learn from the neZEH methodology and find out existing financial tools for large scale hotels renovation.
Benefit from the experience of neZEH pilot hotels.*

3

Build up your renovation plan and a roadmap to achieve nearly zero energy status.

*Follow the example of the neZEH frontrunners.
Use the neZEH Training Material.*

4

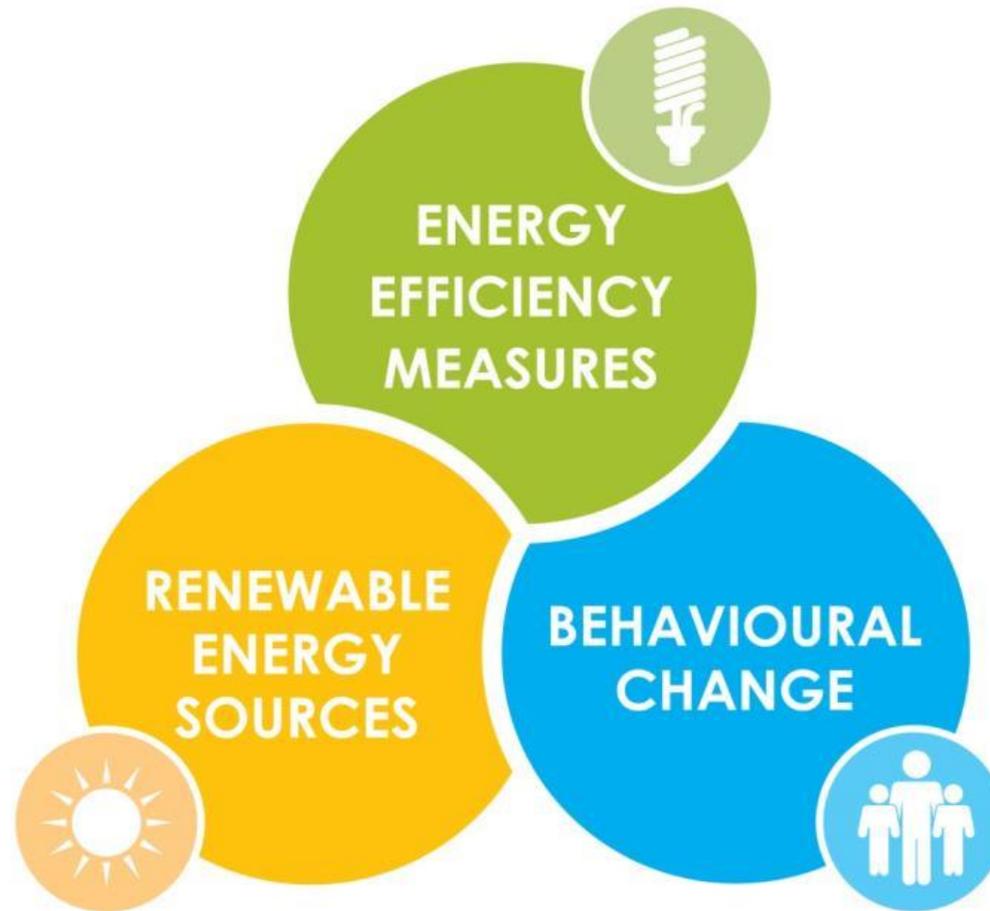
Inform your staff and guests, make them ambassadors of the nearly zero energy experience.

Use the neZEH marketing tools and join the neZEH network.

Being a nearly Zero Energy Hotel implies acting in 3 key areas



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neZEH HIGHLIGHTS - RESULTS



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Energy Audits – Feasibility studies –Renovation plan



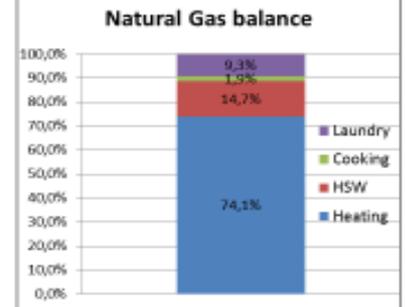
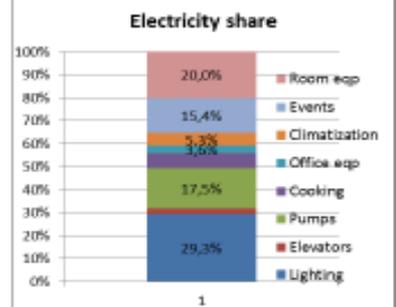
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BALVANYOS ENERGY AUDIT EXECUTIVE REPORT

Category	Balvanyos
Direction	Turia, DJ113 km 22
City	Covasna
Country	Romania
Number of beds	220
Year of construction	2008
Opening schedule	All year
Facilities	Spa, pool, adventure park, conference rooms, restaurant, disco, tennis ground.

Occupancy			
Month	%	Month	%
January	3,5	July	31,7
February	9	August	30,6
March	14,7	September	17,2
April	8	October	13,2
May	40	November	14,2
June	29,2	December	12



- Over 80% of the consumption represents base consumption, independent of occupancy rate.
- Lighting is switched off during day on holiday.

- Cooking, hot water laundry and heating boilers represent the only fuel consumption on site.
- The facility is very close to gas transmission pipe, and the Beneficiary intends to implement CHP.

NEZEH TARGETS

	Heating Functions (*)	Non - Heating Functions (*)	Whole Building
Primary Energy Consumption (kWh/m ² ·y)	341	520	359,5
Reduction required to reach neZEH target (kWh/m ² ·y)	237	416	255,5
Reduction percentage [%]	70%	80	71,7%
RE3 percentage [%]	-	-	31,10%
neZEH RE3 Target [%]	-	-	20%

Proposed measures and estimated investment

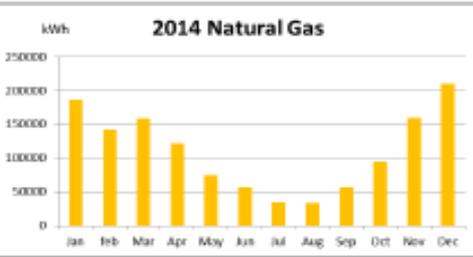
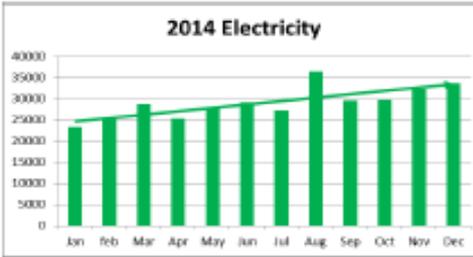
Energy efficiency measures	Energy use	% Savings	Investment €	ROI
Change inefficient lighting to LED technology	Lighting	3,7%	48.920 €	-24%
Smart sensors on lighting circuits	Lighting	1,1%	4.088 €	78%
Solar collectors for hot water on the roof	Hot water	35,1%	143.448 €	108%
VSD on water pumps	Electricity	0,3%	4.880 €	-20%
Implement and actively use BMS	all	17,2%	125.885 €	47%
Insulation of Hot Water Pipes	Hot water	5,2%	0.282€	431%
Building insulation	Heating	15,6%	52.483 €	152%
Photovoltaic panels	Electricity	12%	90.980 €	77%
TOTAL		84,3%	488.435 €	107%

Conclusions

- Conclusions**
- The estimated potential energy savings can reach above neZEH target, however the solutions that have high impact on primary energy savings are expensive, therefore the global degree of feasibility is moderate. If Client considers accessing European funds, ESCO for CHP implementations are possible. Several other no-cost and low/midlevel cost solutions would also penetrate the savings of these investments (some equipment's revamp, inflectors for south facade, daylight sensors).
 - Using biomass has not been evaluated, however it would be a cost effective measure that can also increase the RE3 percentage.
 - There is under construction the Spa center, with swimming pool on other facilities that encourage CHP

Date: 07/10/2015

Signature: Andrei CECLAN, Servelect



Lighting	
Type	%
LED	0,3
Halogen lamps	9
Fluorescent lamps	60
CFL	20
Incandescent	30
Presence detectors	<30%

HVAC & Hot Water		
Type	Num.	Power (kW)
Boilers	2	895
Water pumps	10	3,2
Chillers	1	38
Chiller pumps	2	11

Equipments	
Type	Num.
Elevators	3
TV	119
Computers	12
Fridge	133
Electric cooker	14
Gas cooker	1

- Lamps operating on average 6 hrs per day.
- There are some incandescent bulbs also and rope light.
- Central panel for light switch on corridors.

- Hot water boilers have modular flame, while chiller operates only in summer together with room fan coil.
- Warm water and chiller pumps do not have variable flow control.

- Cookers are the most used equipments, along with food cooling capacities.



Energy efficiency measures proposed to pilots



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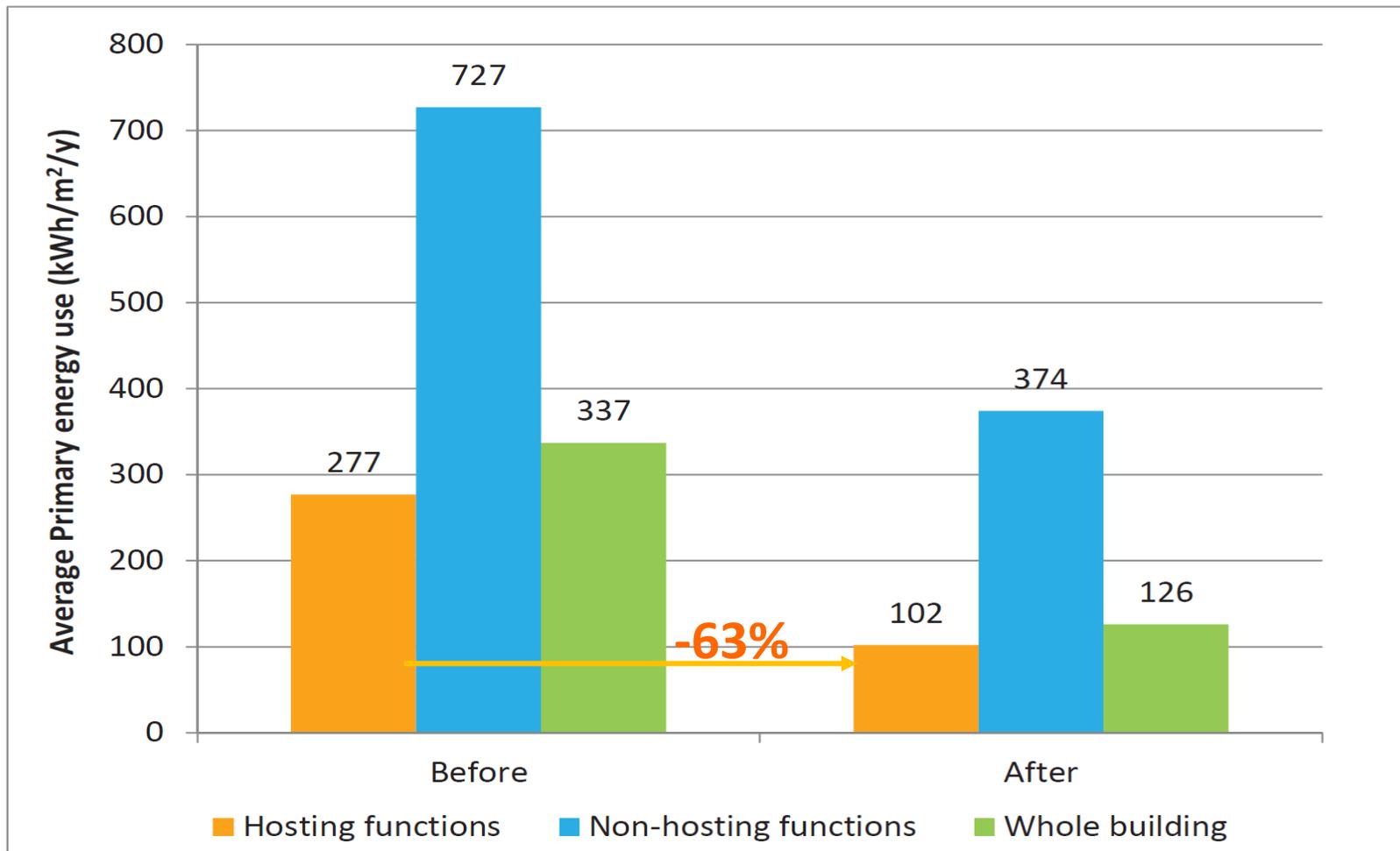
Measure	Savings (%)	Investment (€)	Payback period (years)
Building envelope insulation	2.0-8.0	66,500-350,000	13.0-25.0
Building Energy Management system (BEMS)	3.0-18.5	12,000-110,000	2.0-6.8
Adding ceiling fans and use of control systems for cooling	17.0	95,000	9.5
Replacement of current heat pumps by more efficient ones	4.1- 36.0	50,000-300,000	5.4-11.8
Outdoor redesign for better microclimate	4.0	25,000	4.1
Installation thermostatic valves	21.0	9,800	1.0
Envelope improvements and stop air leaks	35.0	81,253	0.9
Replace existing pumps with VSD models.	0.9	5,460	7.2
Replacing the current boilers by heat pumps	10.0	105,250	8.4
Installation of geothermal heat pump with supplement of electric boiler	58.0	63,465	6.3



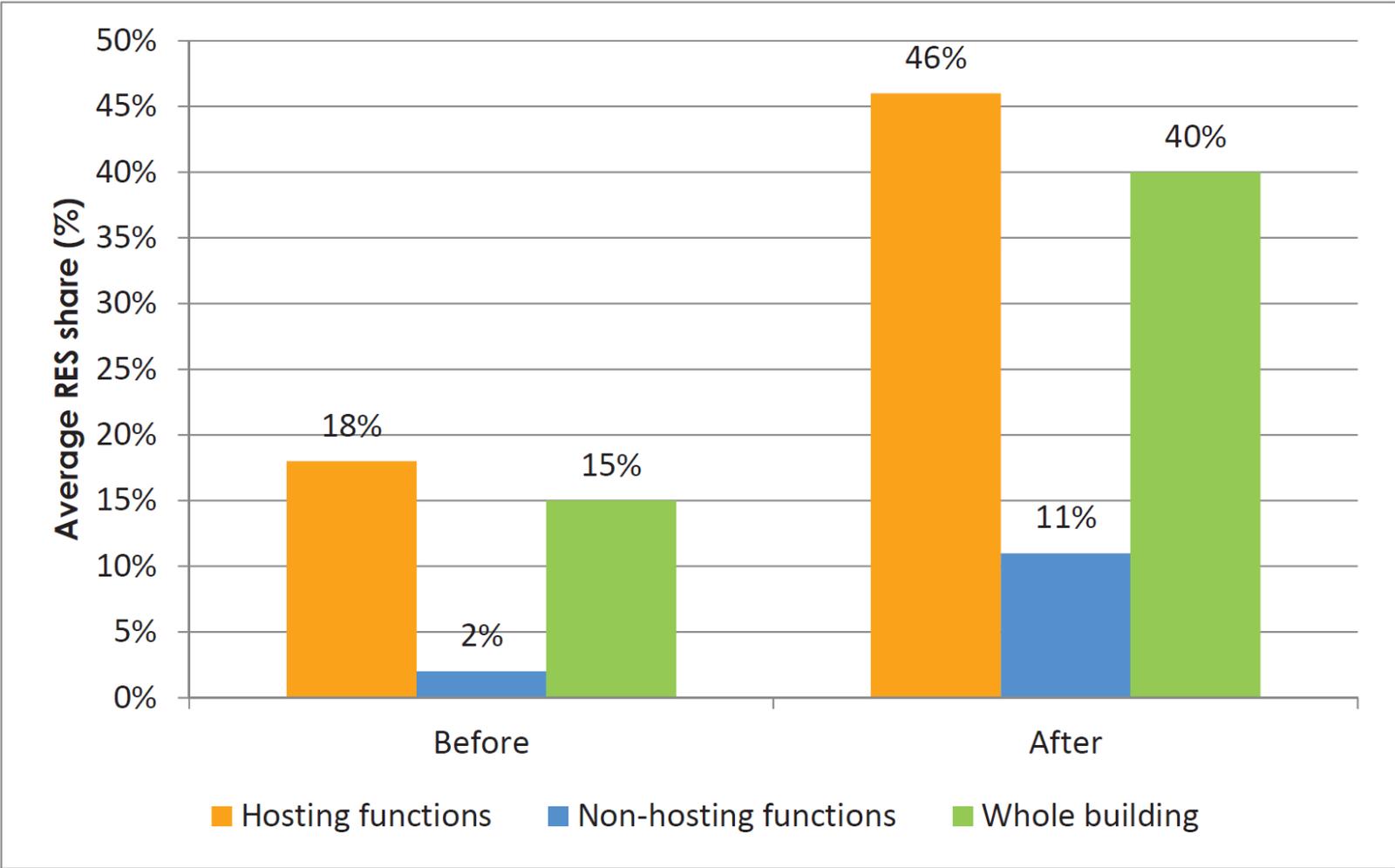
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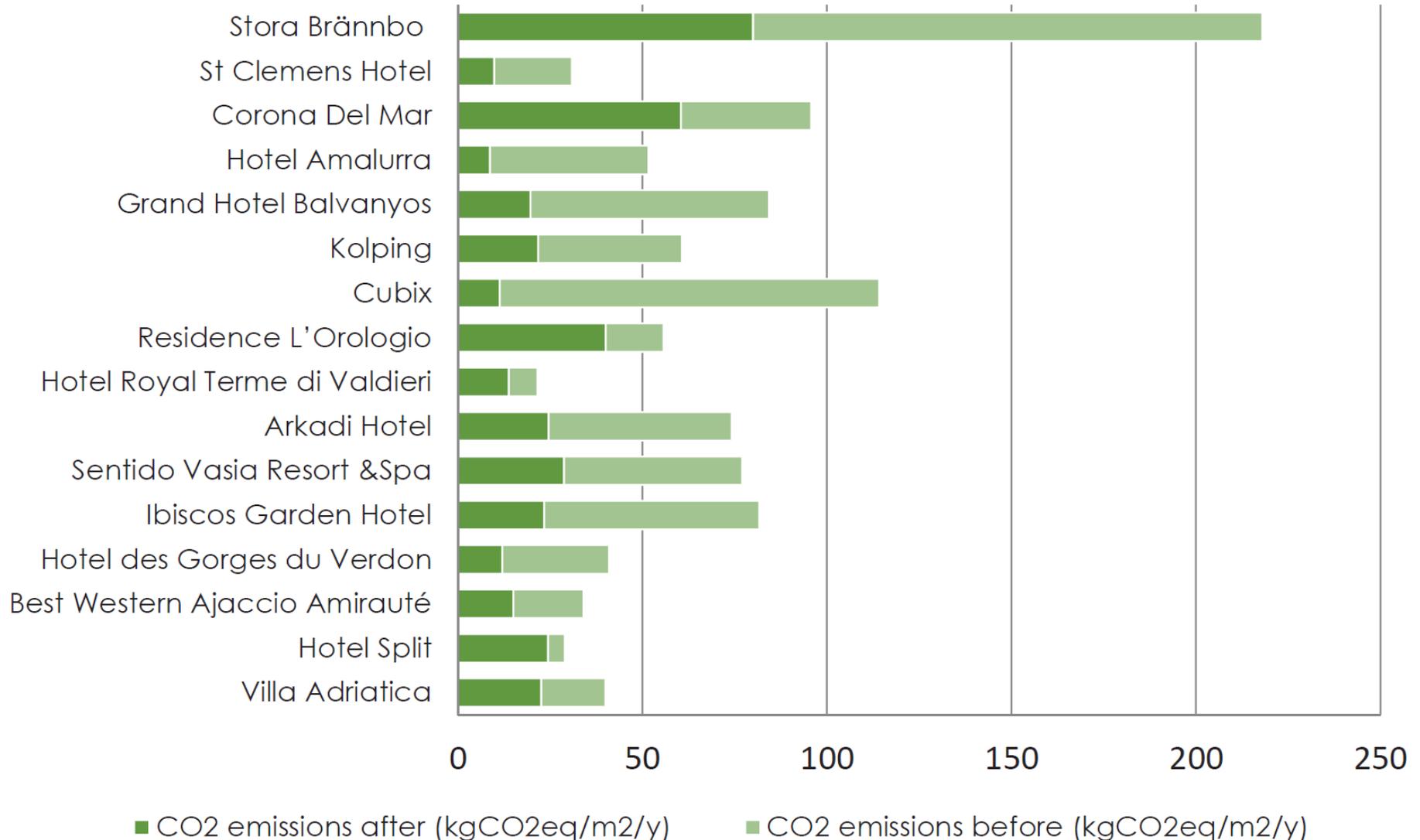
Average primary energy use for the 16 pilot hotels before and after the neZEH renovations



Average RES share for the 16 pilot hotels before and after the neZEH renovations



Reduction of GHG emissions for each pilot hotel (whole building), before and after renovation



	Hotel in Greece	Hotel in Spain	Hotel in Romania
Location	Crete	Vizcaya	Brasov
Climate Zone	1	4	3
Hotel category	Coastal	Rural	Urban
Hotel type	Resort	Resort	Business
Period of operation	Apr-Oct	All year	All year
Average occupancy during months of operation (%)	78%	22%	70%
Offered facilities	pools, bars, restaurants, conference room	spa, pool, shrine room	restaurant, conference room
BEFORE			
Primary energy use, whole building (kWh/m ² /y)	281	202	470
Primary energy use, hosting functions (kWh/m ² /y)	250	181	379
Primary energy use, non-hosting functions	293	226	1258
RES share, hosting functions (%)	26	0	0
AFTER PROPOSED REFURBISHMENT			
Primary energy use, whole building (kWh/m ² /y)	91	127	115
Primary energy use, hosting functions (kWh/m ² /y)	88	96	99
Primary energy use, non-hosting functions	110	162	470
RES share, hosting functions (%)	60	85	37
Emissions avoided (tCO ₂ eq/y)	869.8	93.5	207.8



toe of energy saved per year

1.120 during the project, **13.476 – 42.276 till 2020**



toe of renewable energy produced per year:

332 during the project, **3.984 – 11.312 till 2020**



CO₂e of Greenhouse Gas emissions avoided /year

2.560 during the project, **30.672 – 97.626 till 2020**



investment in sustainable energy

6,3 M€ during the project, **28,1 - 80,1 M€ till 2020**

40,000 €/year can be saved for each hotel





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neZEH TOOLS



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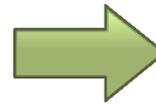
neZEH Tools and Outreach



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A practical e-tool, to empower hoteliers to assess their energy profile and to learn of appropriate technical solutions in order to reach an nZE level. *Consortium upgrade the HES tool including the neZEH Ranking tool - Measures are ranked based on climatic zone, hotel typology and investment cost*



Practical training materials and tips, marketing guidelines and promotional tools.



National neZEH network, to link supply (building professionals) and the demand side (SME hotel owners)

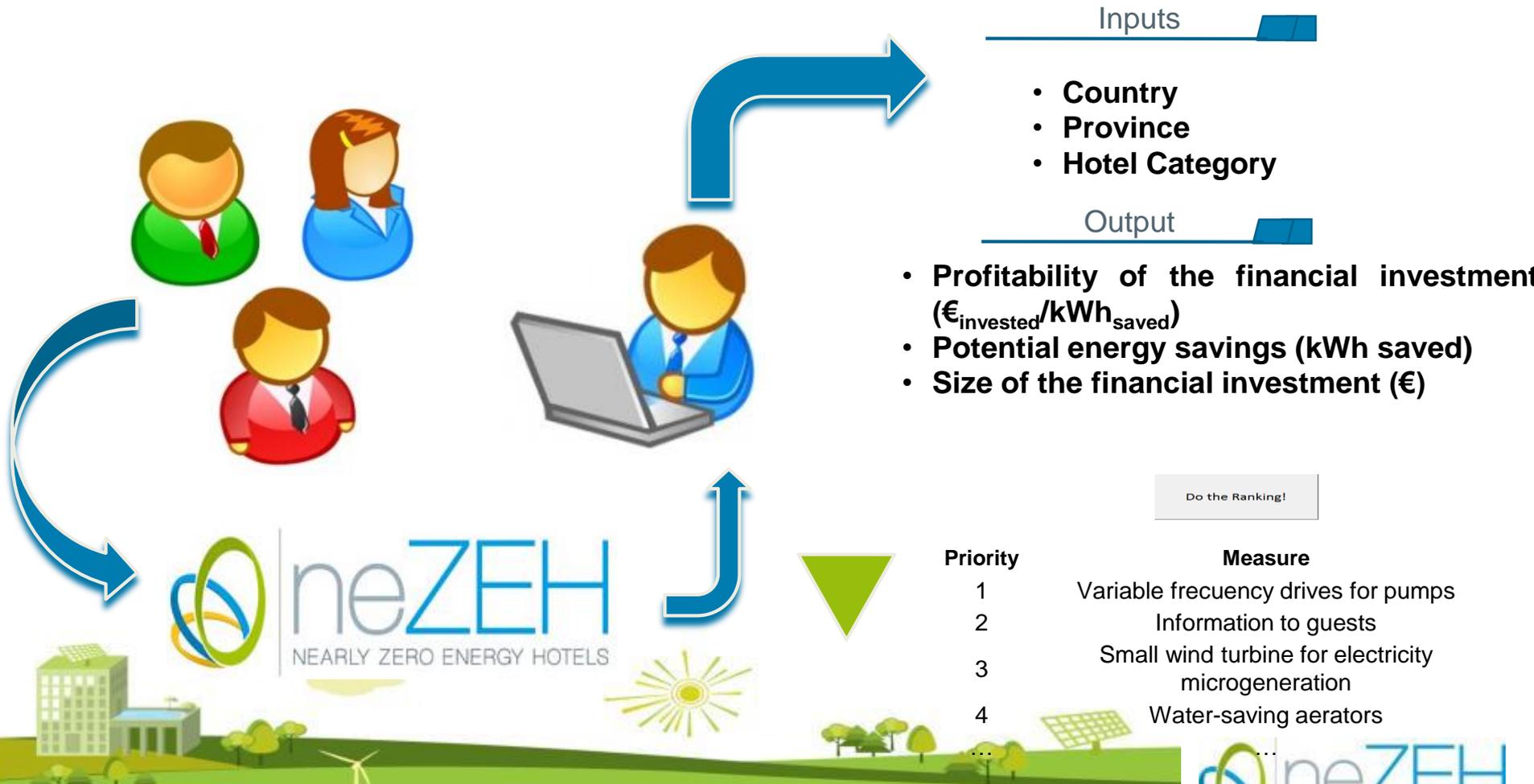


- ✓ **Capacity building activities** engaging more than 1.600 hotel owners and building developers to the neZEH vision;
- ✓ **56.000+ hotel owners/managers** informed/gain access to the project results,
- ✓ **490.000+ citizens and stakeholders**



Technologies Ranking Tool

The Ranking Tool was conceived as a smart way for hoteliers to test their own buildings and know how far their buildings are from the neZEH status



Current project: **Test1**

You have complete the questionnaire! The following reports are available:

 [Questionnaire](#)

 [neZEH report](#)

 [Energy measures towards neZEH](#)

 [Carbon footprint](#)

 [Investment data](#)

 [neZEH Showcase of pilot hotels](#)

Nearly Zero Energy Hotel (neZEH) report



Evaluation of your hotels' current energy consumption and renewables use compared to regional and national neZEH level

Energy measures towards neZEH



Improve your hotels' current energy consumption and use of renewables to reach neZEH level

Carbon footprint



Measuring your hotels' impact on our climate by estimating the total set of greenhouse gases (GHG) emissions.

Return on investment calculator



Assessing which investment could achieve the best return on investment (ROI) and payback period

Current project: **TEST TUC**



 Questionnaire

 neZEH report

 Energy measures towards neZEH

 Carbon footprint

 Investment data

 NEZEH Showcase of pilot hotels

Nearly Energy Zero Hotel (neZEH) report

Energy consumption

To become NEZEH you should decrease your energy consumption per m² per year by **416.89 kWh** per m² per year to reach the limit of 122 kWh per m² per year. See how in our [energy measures](#) section! Your energy performance (kWh per m² per year) is : **538.89** and categorize your hotel as : Very Poor (E)



Renewable energies

The other condition to become NEZEH you should increase the percentage of renewables energy by **48.97%** to reach the limit of 50%. See how in our [energy measures](#) section!

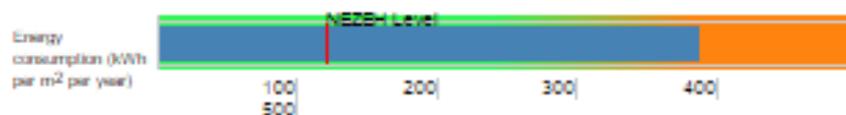


Current project: Test1 

Nearly Zero Energy Hotel (neZEH) report

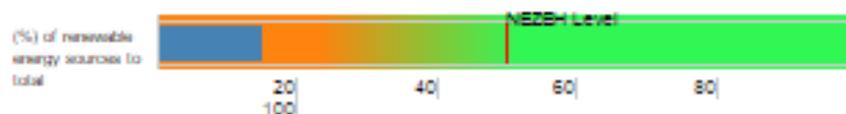
Energy consumption

To become neZEH you should decrease your energy consumption by 288.41 kWh per m² per year to reach the limit of 122 kWh per m² per year. See how in our [energy measures](#) section! Your energy performance (kWh per m² per year) is : 388.41 and categorize your hotel as : Below average (D)



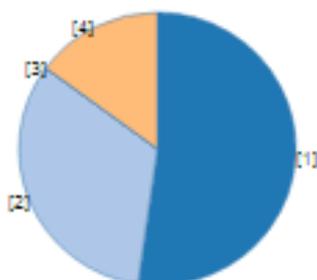
Renewable energies

The other condition to become neZEH is to increase the share of renewable energy used in your hotel from 14.93% that is today to 60% See how in our [energy measures](#) section!



Energy sources in your hotel

- Legend**
- [1] Electricity purchased from supplier 52.24%
 - [2] Fossil fuels purchased from suppliers 32.84%
 - [3] Biomass 0%
 - [4] Renewable energy from own generation 14.93%



Renewable Energy Sources in Use

Solar thermal energy in kWh 20000 kWh



February 2017, Brussels

Policy interventions



Nearly Zero Energy towards low carbon growth in the E

neZEH Position paper

NEARLY ZERO ENERGY HOTELS

www.nezeh.eu

Common features of EU countries for energy performance

- Improving energy efficiency in the tourism sector relates to energy policies which are not always part of tourism authorities' portfolios, nor are policies related to buildings.
- Ministries and authorities in charge of tourism are often not aware of the EPBD and EED obligations which apply to hotel buildings. At the same time, authorities that are in charge of support policies for energy efficiency in buildings are not aware of the special characteristics of the tourism sector, nor the possible synergies that can be exploited when drafting energy refurbishment or defining NZEB criteria.
- Discussion of energy or resource efficiency in the tourism sector usually refers to either sustain Corporate Social Responsibility (CSR) strategies for SMEs, and relates to regulations for the tourism sector in the public domain, as issues of resource efficiency are related to tourism standards regulations. There is an obvious need to better address the tourism-energy-buildings nexus.
- Existing Member States level legislation to define numerical values mostly for new buildings. It is difficult to comply with the case of a refurbished building. The different and realistic NZEB criteria for buildings.
- Hotels represent a specific building type with a high ratio of the delivered energy demand for non-hosting, hotel-specific functions. This should be recognised as a specific category in Member States' building regulations.

Key challenges for SME hotels: the of hotel buildings and energy performance

- The highest priority for SME hotels is to reduce their operational costs and boost their competitiveness. However in the majority of the neZEH countries, reducing energy-related operational costs requires significant investment in energy efficiency renovation.
- SME Hotels lack technical knowledge and awareness of buildings energy efficiency issues; they do not have skilled personnel to deal with technical building maintenance or energy management issues.
- The majority of SMEs cannot prepare their own refurbishment plans, are lost when it comes to look for incentives related to energy measures, and do not have access to private loans in the current economic environment.
- Resource efficiency / sustainability certification schemes are the most common approach SME Hotels can relate to, for understanding neZEH level requirements.
- SME hotels do not have the capacity to leverage available support policies and do not know how to use available existing support schemes for investing in energy efficiency. Furthermore, they lack information on how to plan and implement energy efficiency investments.
- SME Hotels have difficulties in understanding the full economic benefit of investing in energy retrofit in companies.
- SME hotels business models can make it difficult to achieve neZEH status. Many EU hotels do not own the buildings in which they operate.

Tourism is
European
The tourism
and by 1.8
Because of
fragmented
understand
building

NEZEH POLICY RECOMMENDATIONS

Improving policies for tourism, at European,
national and regional level

There is an obvious need to address the tourism-energy-buildings nexus at all levels. The implementation of energy performance measures by the accommodation industry presents opportunities to boost its competitiveness, but this is not always well understood and the capacity to engage is limited. Such measures require the attention and support from related policy makers at the local level.

The neZEH consortium is proposing to bridge this gap, by presenting possible avenues to policy makers, through the key findings stemming from the work carried out in seven neZEH target countries. Local, regional and national authorities were consulted in the field of tourism, energy and building regulatory bodies, as well as SME Hotels championing to become neZEH.

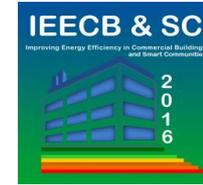
ISSUE 1: Member States policy makers do not differentiate the specificities of the accommodation sector - which are primarily buildings and SMEs - while preparing their National NZEB policies.

National NZEB definitions do not sufficiently recognize the specificities of the accommodation industry. They should address the particular building features, uses and operating models, since building cannot be considered as typical non-residential buildings; their business models usually include a number of energy intensive operations associated with their customers' comfort and expectations, which are therefore closely linked with their competitiveness and viability. In order to develop viable scenarios for hotels, a "modular" benchmarking could be considered to include the non-hosting functions. Furthermore, different targets should be set for new and renovated buildings.

Different measures could be promoted in different climate zones within a particular country; data at a national and regional level should be evaluated to prioritize the available measures, according to their cost-efficiency depending on the climate zone.

- RECOMMENDATION 1:**
- EU Policy makers should coordinate a dialogue between DG Energy and DG Growth to:
- Identify the specificities of the accommodation industry and address these features in NZEB approach and targets in national level;
 - Define better guidance for NZEB for refurbished buildings - SME Hotels.





neZEH Policy event in EU Parliament, COP21 neZEH events, neZEH 2015 and neZEH 2016 Int. 42 neZEH events (13 EU/Int. level, 29 national)



- Strong motivation – in several cases the hoteliers self-financed the renovation
- Examples include different hotel typologies (urban, coastal, mountain) vs different financing schemes
- Independent technical support as a key driver (trust-credibility)
- Public commitment of the front runners hoteliers
- Engagement of tourism stakeholders - Positive political will
- High interest for outcomes from all EU MS and outside EU
- Replications in the pipeline





NEARLY ZERO ENERGY HOTELS

The European Union forces for radical reduction of greenhouse gas (GHG) emissions, 80-95%, by 2050 in comparison to 1990 levels. The existing building stock is responsible for 40% of total energy consumption and 36% of GHG emissions, therefore demonstrates the higher potential for energy savings. To reach the 2050 targets, large scale renovations towards Zero Energy are in the forefront of the EU policies.

The European initiative **Nearly Zero Energy Hotels (neZEH)** aims at accelerating the rate of refurbishment of existing hotels into Nearly Zero Energy Buildings (nZEB) by:

- providing technical advice to committed hoteliers
- demonstrating the profitability, feasibility and sustainability of investments towards nearly Zero Energy
- undertaking training and capacity building activities
- promoting front runners at national, regional and EU level, to increase their market visibility

neZEH is a response to the *European Directive on the energy performance of buildings (2010/31/EU, EPBD recast)*, contributing directly to the EU 2020 targets and supporting EU Member States to their national plans for increasing the number of nZEBs.

The neZEH initiative will run for three years (2013-2016) and is co-funded by the Intelligent Energy Europe Programme (IEE) of the European Commission.

[Learn more on the neZEH initiative](#)

16 Hotels in Europe will benefit of technical assistance to become neZEH.

What is an nZEB

A nearly Zero-Energy Building (nZEB) is a building that has....

[read more...](#)

Why become a neZEH

Becoming a neZEH will lead to great benefits for your business, you will....

[read more...](#)

Join the neZEH network

Want to be a pioneer in the EU hotel industry? Join the neZEH network! You will....

[read more...](#)

News

- ▶ [Join neZEH 2016 International Conference at FITUR GREEN 2016 in Madrid – 20 January 2016](#)
- ▶ [JOIN neZEH AT THE COP21 – 8, 10 and 11 December 2015](#)
- ▶ [Press Release: 16 nearly Zero Energy Hotels Inspiring Europe to achieve nearly Zero Energy targets](#)
- ▶ [Join neZEH Workshop In Climamed 2015](#)

[Read More](#)



Training and Capacity Building

- Training courses for hotel owners and staff.
- Technical guides, practical informational material.
- Access to experts' advice.



E - toolkit

- Assess your energy performance.
- Find out solutions to minimize your hotel's energy cost and to reach neZEH status.
- Get an estimate of cost and return on investment.



Marketing tools

- Tailor made marketing guidelines and promotional tools for nearly zero energy hotels.
- Visibility at European and national level.



neZEH community

- Be part of a European network.
- Exchange experiences and know-how with other hotel owners.
- Link hoteliers with building professionals and energy companies.



About ReSEL TUC

Key activities



TECHNICAL UNIVERSITY OF CRETE (TUC)
SCHOOL OF ENVIRONMENTAL ENGINEERING
RENEWABLE AND SUSTAINABLE ENERGY
SYSTEMS LABORATORY

SUSTAINABLE ENERGY POLICY
AND PLANNING



RENEWABLE ENERGY
TECHNOLOGIES



SUSTAINABLE BUILDING



BIOMASS - BIOFUELS



Dealing both with **technological** (technology research and development, testing, demonstration) and **non – technological** issues (knowledge transfer, replicable models, markets policies, dissemination, professional training and capacity building).

www.resel.tuc.gr



Projects in the field of Sustainable Energy

40+ projects as coordinators and 60+ participating as experts (i.e. H2020, MED, Intelligent Energy-Europe, Interreg, COST, FP5, FP6, FP7, LEONARDO, LIFE+) and national contracts:

- > sustainable energy planning at regional/local level
- > technoeconomic analysis of sustainable energy applications
- > environmental impact assessment
- > knowledge transfer (industry, buildings, transport, public authorities)
- > dissemination/networking activities on energy and environment
- > commercialization of new energy technologies
- > professional training and capacity building for trainers, technical staff and public authorities

Indicative recent EU projects

Coordination



Participation



Thank you!

For further info, contact the project coordinator

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