step2sport

step by step renovation towards nearly zero energy SPORT buildings

neZEH
NEARLY ZERO ENERGY HOTELS

The neZEH Project

Flagship projects and tools for hoteliers

Stavroula Tournaki
Technical University of Crete

Final Dissemination Event
21 February 2017, Brussels

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

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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

step2sport

Final Dissemination Event, 21 February 2017, Brussels

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Tourism, Hotels and climate change

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

1% of total CO_2 emissions globally is from hotels

160 – 200 kg CO_2 / m^2

Hotels may save up to

70% of their energy consumption

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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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neZEH objectives

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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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UNWTO

Network of European Regions for a Sustainable and Competitive Tourism
NECSTouR

REHVA
Federation of European Heating, Ventilation and Air-conditioning Associations

ENERGIES 2050

Istituto Superiore sui Sistemi Territoriali per l'Innovazione

Sustainable innovation

ABMEE

creara
ENERGY EXPERTS

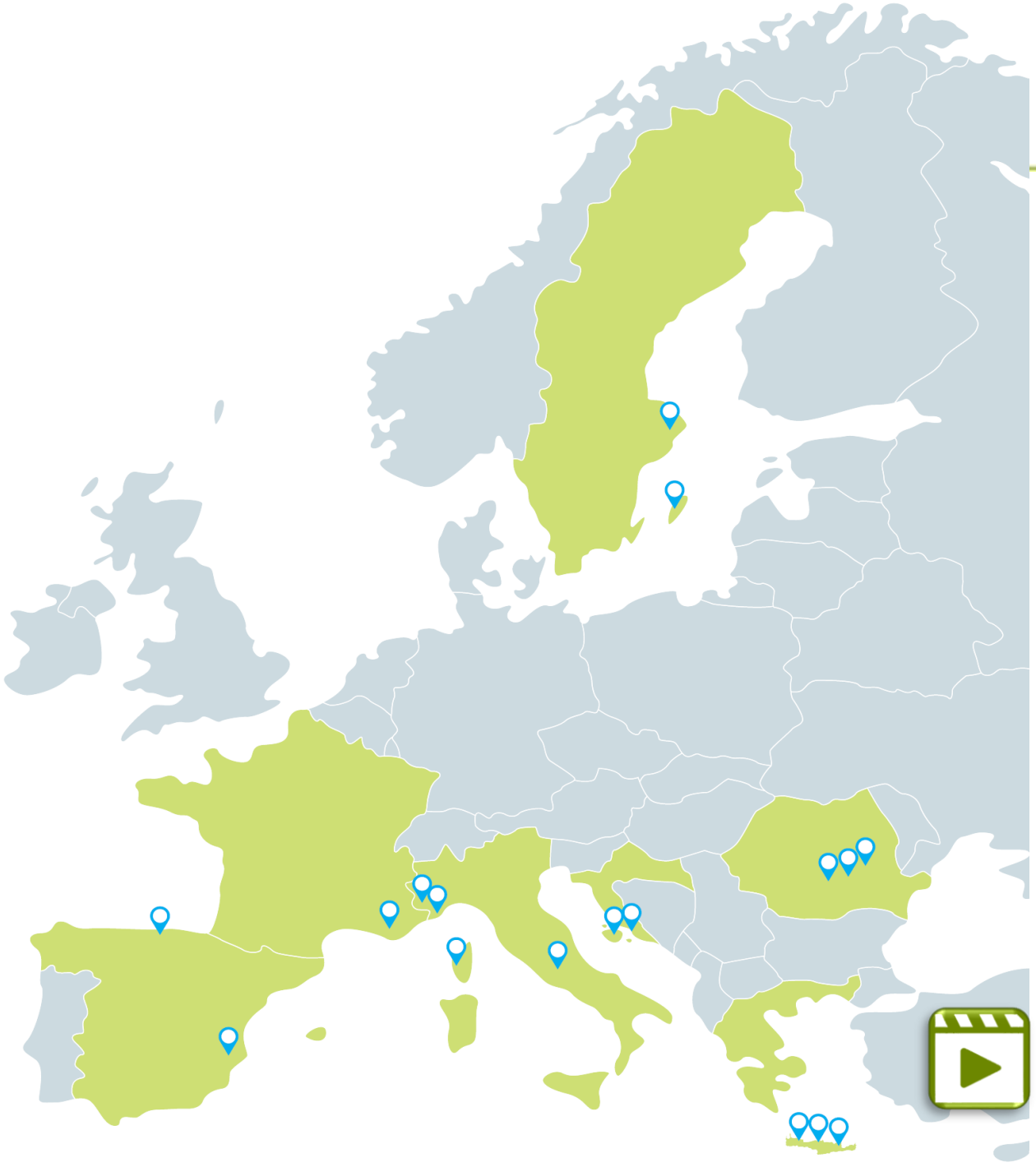
EIHP

hotels towards neZEH hotels towards

7 EU countries

16 neZEH hotels

4 neZEH hotels awarded



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THE neZEH Approach

What is a neZEH hotel

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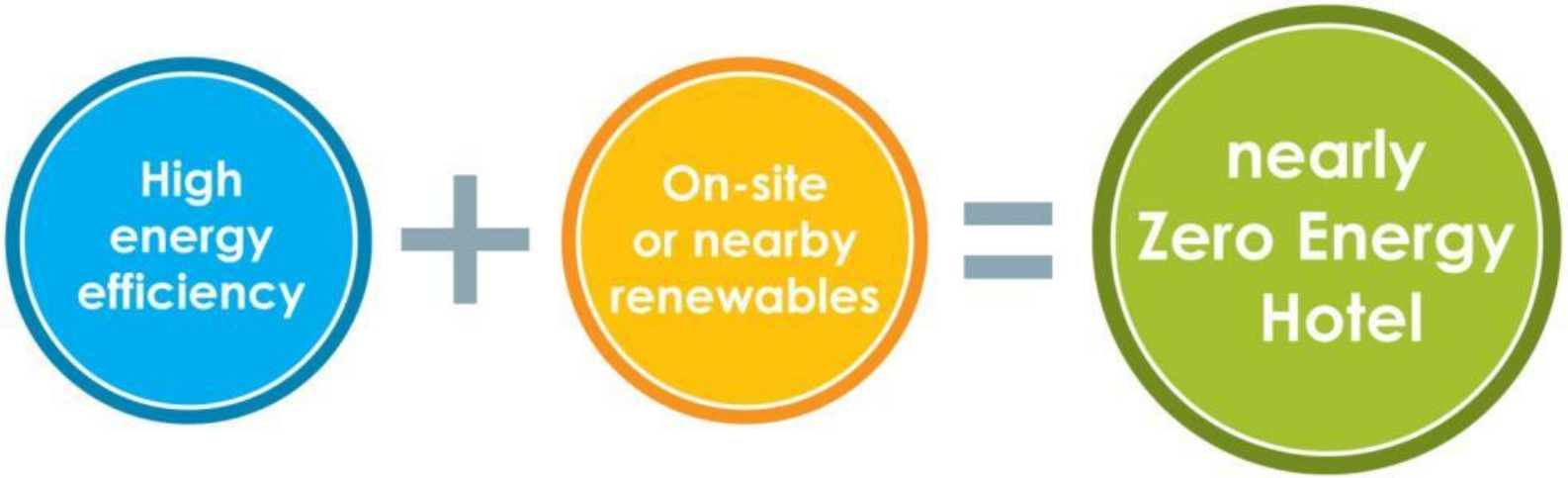

A nearly Zero-Energy Hotel (neZEH) is a hotel that has a very high energy performance. The nearly zero or very low amount of energy required should be covered to a very significant extent from renewable sources, including energy from renewable sources produced on-site or nearby.

Following the EPBD recast

neZEH targets: country specific benchmarks which constituted by a **primary energy indicator** (kWh/m^2/y) and a **RES Ratio** (%), including benchmarks for refurbished buildings

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Hotels are not typical buildings

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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

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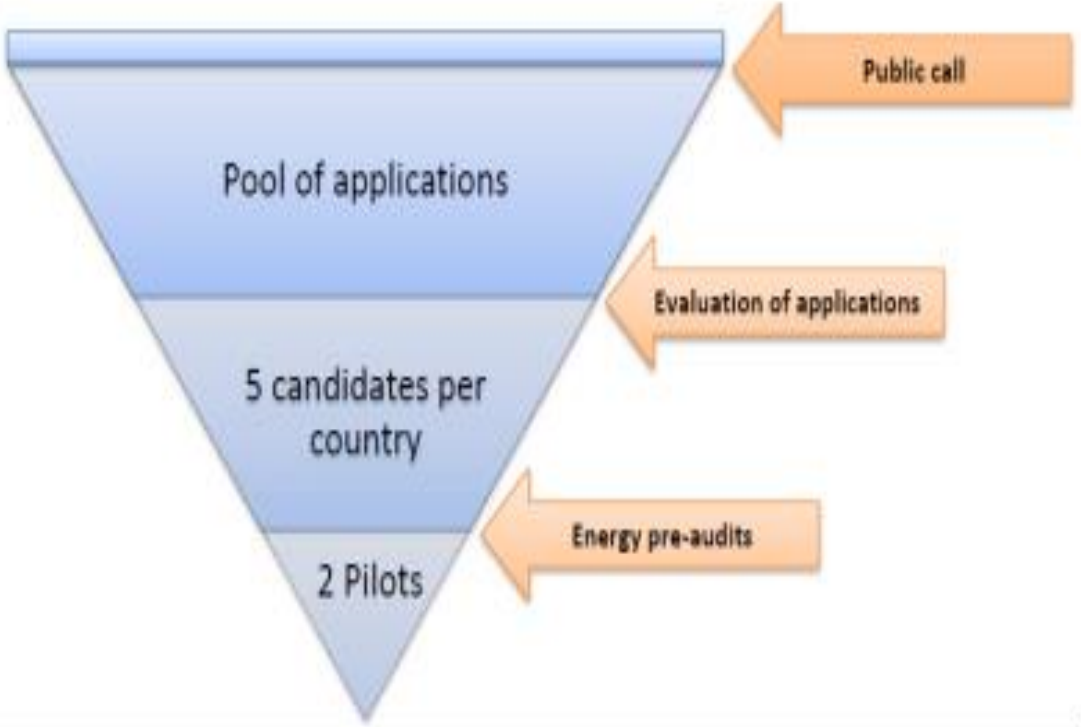

1. Open call, reached 4.000 → **85 applications**
2. Evaluation of applications using a set of criteria → initial selection of **40 hotels**
3. Energy pre-audits, to initially assess their potential and capability of reaching nZE target → **2-3 pilot hotels per country**

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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Typologies

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Resort

URBAN

COASTAL

Business

RURAL

MOUNTAIN

Spa/Wellness

B&B

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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**

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

Energy Audits – Feasibility studies –Renovation plan

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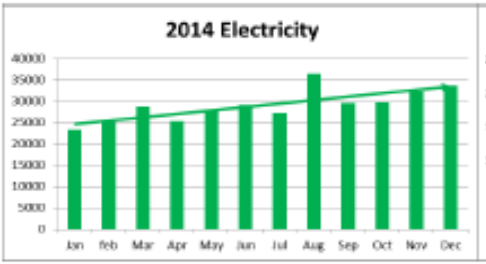
BALVANYOS ENERGY AUDIT EXECUTIVE REPORT

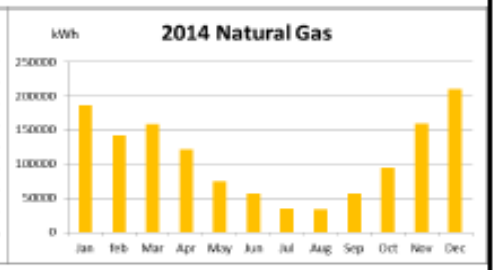
Hotel info

	Balvanyos
Category	****
Direction	Turia, DJ113 km 22
City	Covasna
Country	Romania
Number of beds	220
Year of construction	2006
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





Lighting

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

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

HVAC & Hot Water

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

- 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.

Equipments

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

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

SERVELECT

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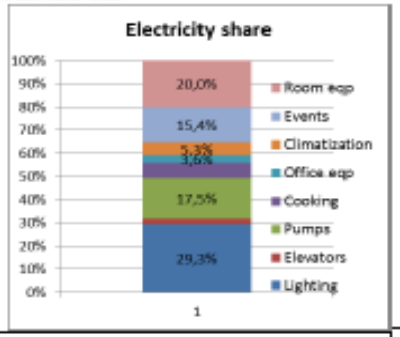
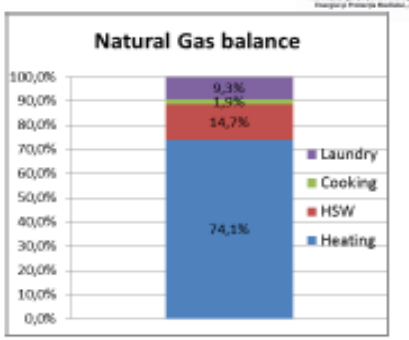


- Over 80% of the consumption represents base consumption, independent of occupancy rate.
- Lighting is swiched off during day on holway.



- 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

	Hosting Functions (*)	Non - Hosting Functions (*)	Whole Building
Primary Energy Consumption (kWh/m²y)	341	520	359,5
Reduction required to reach neZEH target (kWh/m²y)	237	416	255,5
Reduction percentage [%]	70%	80	71,7%
RES percentage [%]	-	-	31,10%
neZEH RES 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	783%
Solar collectors for hot water on the roof	Hot water	35,1%	143.448 €	108%
VSD on water pumps	Electricity	0,3%	4.860 €	-20%
Implement and actively use BMS	all	17,2%	125.685 €	47%
Insulation of Hot Water Pipes	Hot water	5,2%	9.282€	431%
Building insulation	Heating	15,6%	52.483 €	152%
Photovoltaic panels	Electricity	12%	99.669 €	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/medium cost solutions would also potentiate the savings of these investments (some equipment's revamp, inflectors for south façade, daylight sensors).
- Using biomass has not been evaluated, however it would be a cost effective measure that can also increase the RES 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

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

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

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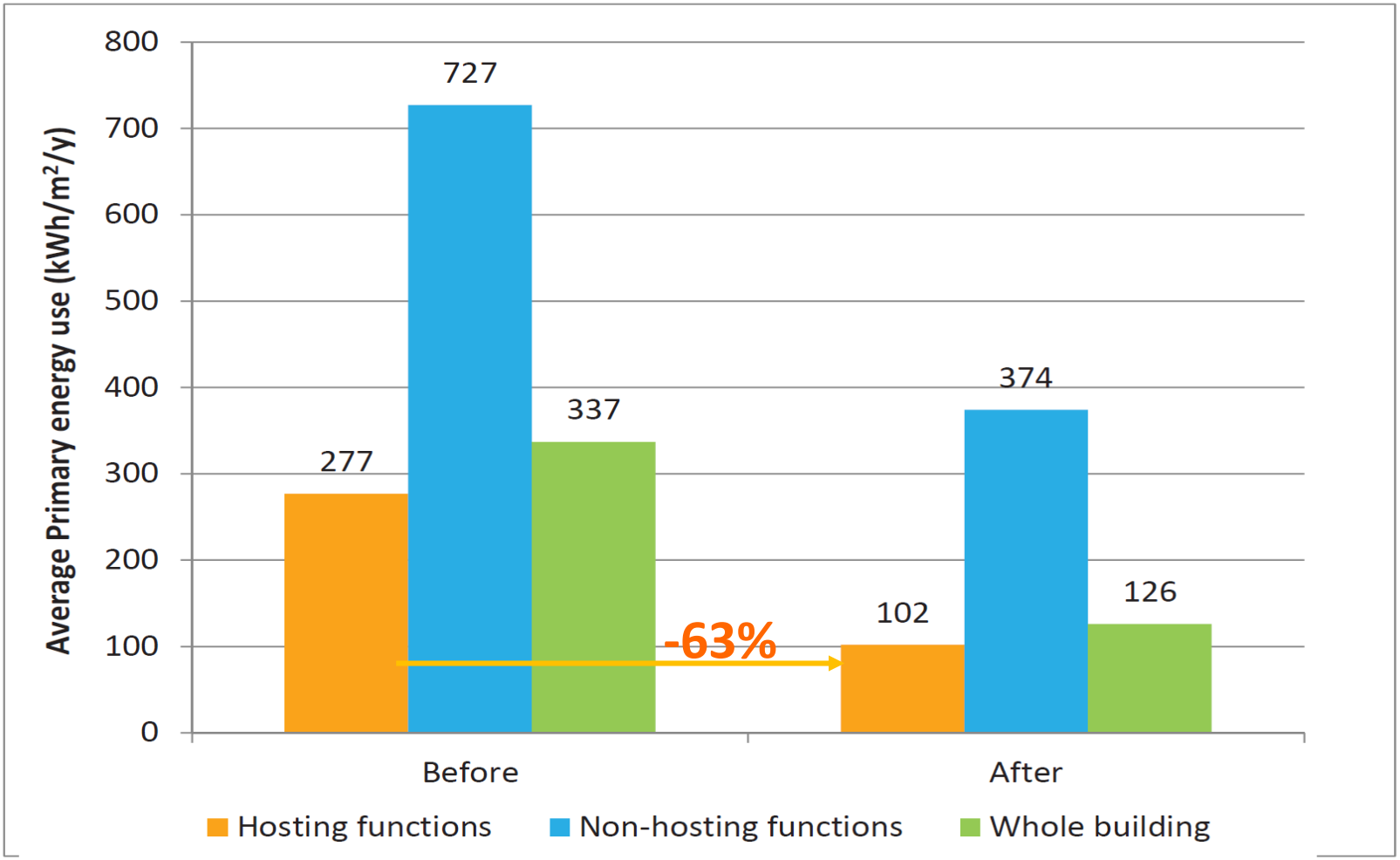

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Average RES share for the 16 pilot hotels **before and after** the neZEH renovations

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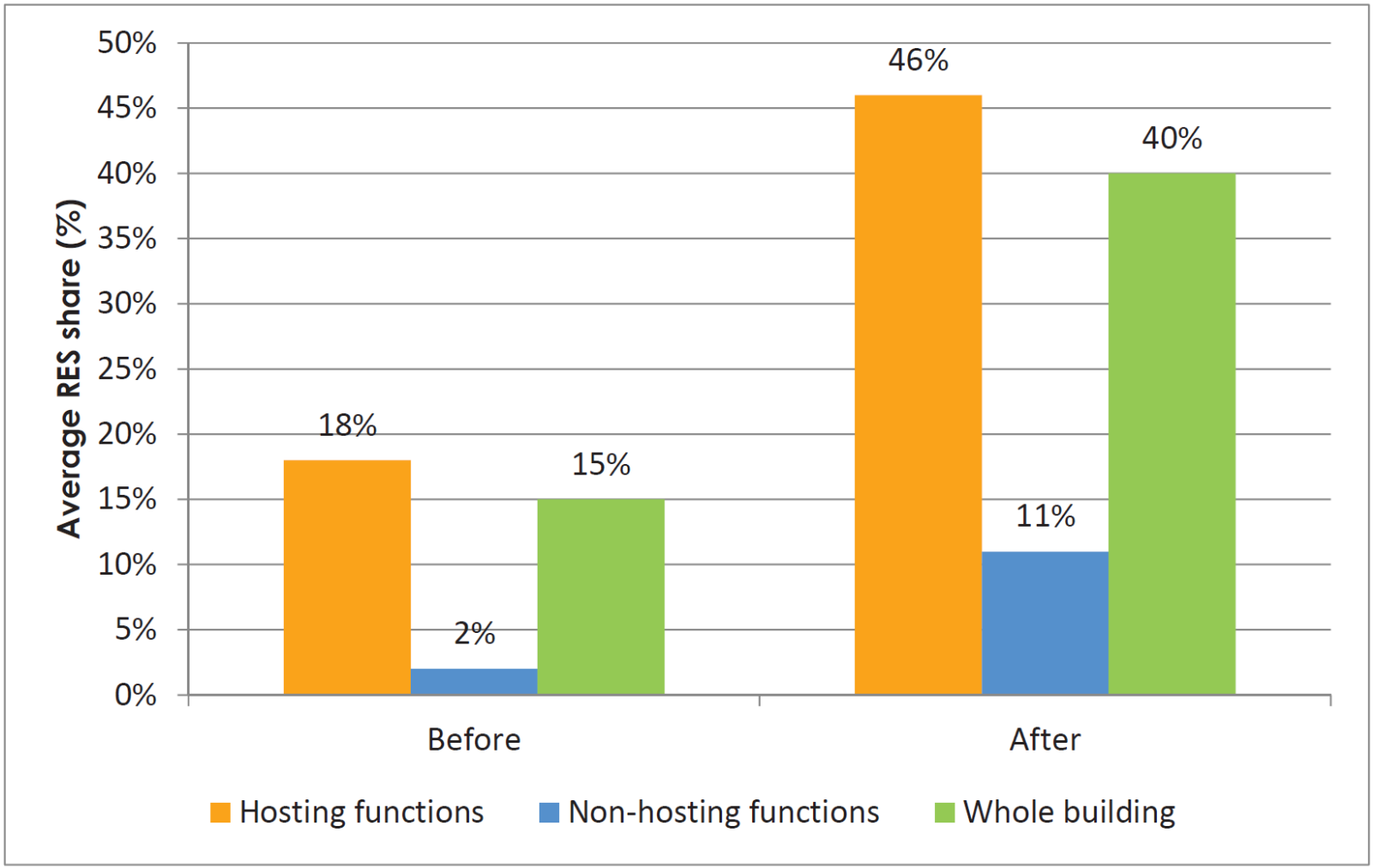

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Reduction of GHG emissions for each pilot hotel (whole building), before and after renovation

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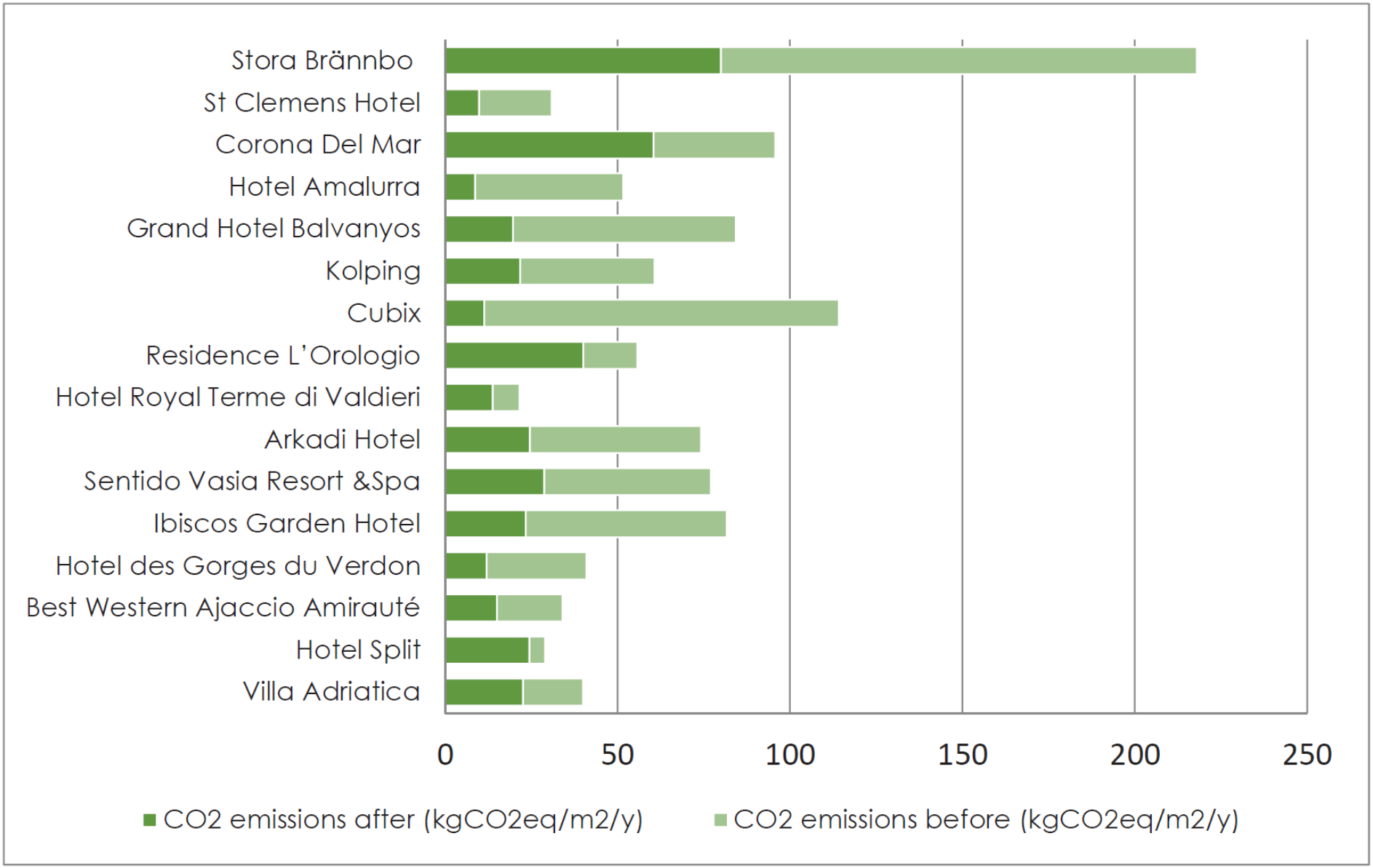

	Hotel in Greece	Hotel in Spain	Hotel in Romania
Location	Crete	Vizcaya	Brasov
Climate Zone	1	4	3
Hotel category	Coastal	Rural	Urban
Hotel type	Resort	Resort	Business
Period of operation	Apr-Oct	All year	All year
Average occupancy during months of operation (%)	78%	22%	70%
Offered facilities	pools, bars, restaurants, conference room	spa, pool, shrine room	restaurant, conference room
BEFORE			
Primary energy use, whole building (kWh/m²/y)	281	202	470
Primary energy use, hosting functions (kWh/m²/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/m²/y)	91	127	115
Primary energy use, hosting functions (kWh/m²/y)	88	96	99
Primary energy use, non-hosting functions	110	162	470
RES share, hosting functions (%)	60	85	37
Emissions avoided (tCO_2eq/y)	869.8	93.5	207.8

Performance indicators

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	toe of energy saved per yeαr 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

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***

HOTEL ENERGY SOLUTIONS e-toolkit

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

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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

Inputs

- **Country**
- **Province**
- **Hotel Category**

Output

- **Profitability of the financial investment ($€_{invested}/kWh_{saved}$)**
- **Potential energy savings (kWh saved)**
- **Size of the financial investment (€)**

Do the Ranking!

Priority	Measure
1	Variable frecuency drives for pumps
2	Information to guests
3	Small wind turbine for electricity microgeneration
4	Water-saving aerators
…	…

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neZEH toolkit Beta Version

Questionnaire
neZEH report
Energy measures towards neZEH
Carbon footprint
Investment data
neZEH Showcase of pilot hotels

Current project: **Test1**

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

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 hotesl' 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

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neZEH toolkit

HOME | ABOUT neZEH | PARTNERS | PILOT CASES | LIBRARY | NEWS | LINKS | CONTACT U

Project | My account | My projects | User: **test_hotel** | Log Out

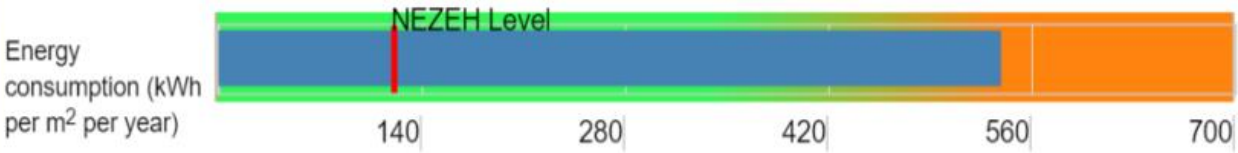
- Questionnaire
- neZEH report
- Energy measures towards neZEH
- Carbon footprint
- Investment data
- NEZEH Showcase of pilot hotels

Current project: **TEST TUC**

Nearly Energy Zero Hotel (neZEH) report

Energy consumption

To become NEZEH you should decrease you energy consumption per m^2 per year by **416.89** kWh per m^2 per year to reach the limit of 122 kWh per m^2 per year See how in our energy measures section!Your energy performance (kWh per m^2 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!

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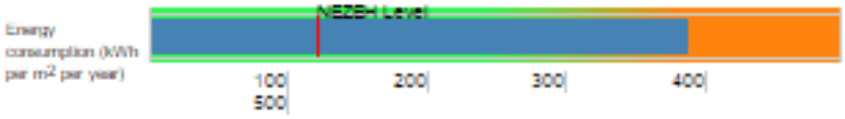
Current project:Test1

Nearly Zero Energy Hotel (neZEH) report

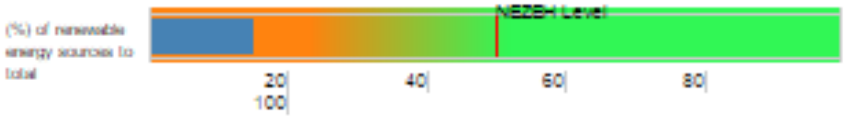
Energy consumption

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)**

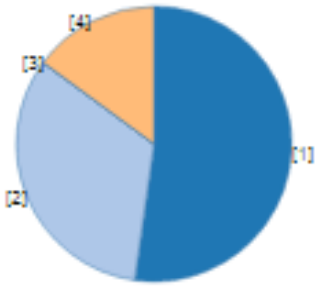


Renewable energies

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

Policy interventions

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

LABEL
PARIS2015
COP21·CMP11

SOLUTIONS
COP21
PARIS 2015

SUSTAINABLE ENERGY
WEEK 23-27 JUNE 2014

Fitur
Green

IEECB & SC
Improving Energy Efficiency in Commercial Buildings and Smart Communities
2016

neZEH
NEARLY ZERO ENERGY HOTELS

Lessons learnt

TECHNICAL UNIVERSITY OF CRETE (TUC)
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- 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

neZEH
NEARLY ZERO ENERGY HOTELS

neZEH 2016 International Conference
Nearly Zero Energy Hotels, the Potential for Change
Madrid, Spain – January 20th, 2016

Learn more!

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

JOIN THE neZEH NETWORK: www.nezeh.eu

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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.

www.nezeh.eu

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About ReSEL TUC
Key activities

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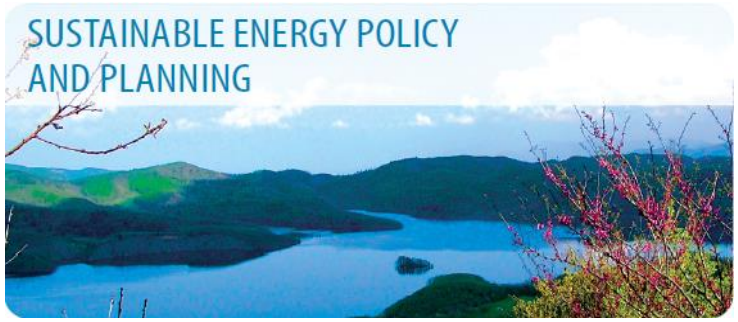

Dealing both with **technological** (technology research and development, testing, demonstration) and **non – technological** issues (knowledge transfer, replicable models, markets policies, dissemination, professional training and capacity building).

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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

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Indicative recent EU projects

Coordination

neZEH
NEARLY ZERO ENERGY HOTELS

PVTRIN
INSTALLER CERTIFICATION

ReRina

Participation

2020 CiViTAS
Cleaner and better transport in cities
DESTINATIONS

THE CIVITAS INITIATIVE
IS CO-FINANCED BY THE
EUROPEAN UNION

PVPARITY

Interreg
Mediterranean
COMPOSE

Green
Partnerships

RECOIL
THE POWER OF USED COOKING OIL

UPSWING
BUILD UP SKILLS

BUILD UP
SKILLS
ENERGY TRAINING
FOR BUILDERS

PURE
Promotion of Building Integrated Photovoltaics

promotion3e
ENERGY EFFICIENT EQUIPMENT

SOLCO

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Thank you!

For further info, contact the project coordinator

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