

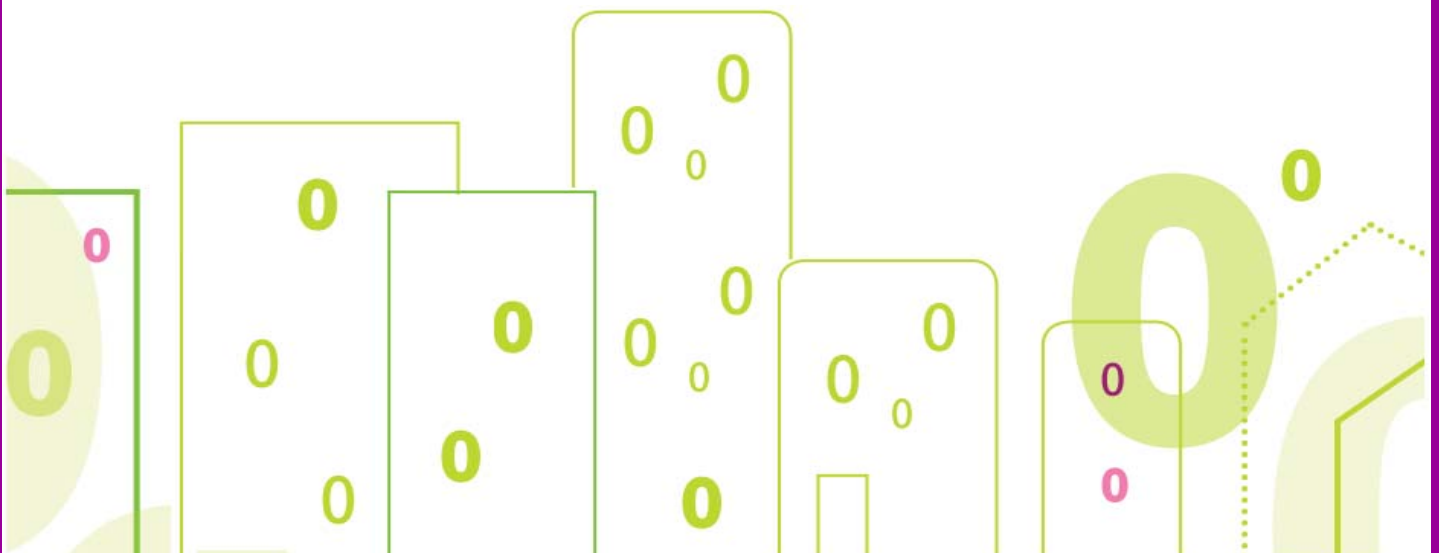
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**NEARLY
ZERO
ENERGY
HOUSING IN
DIVIDED OWNERSHIP**

THE NEARLY-ZERO ENERGY CHALLENGE IN DIVIDED AND COOPERATIVE OWNERSHIP

nZEB in Divided and Cooperative Ownership in practice:
Lessons Learnt



Authors:

Sergio Rossi (Delsus, FI)

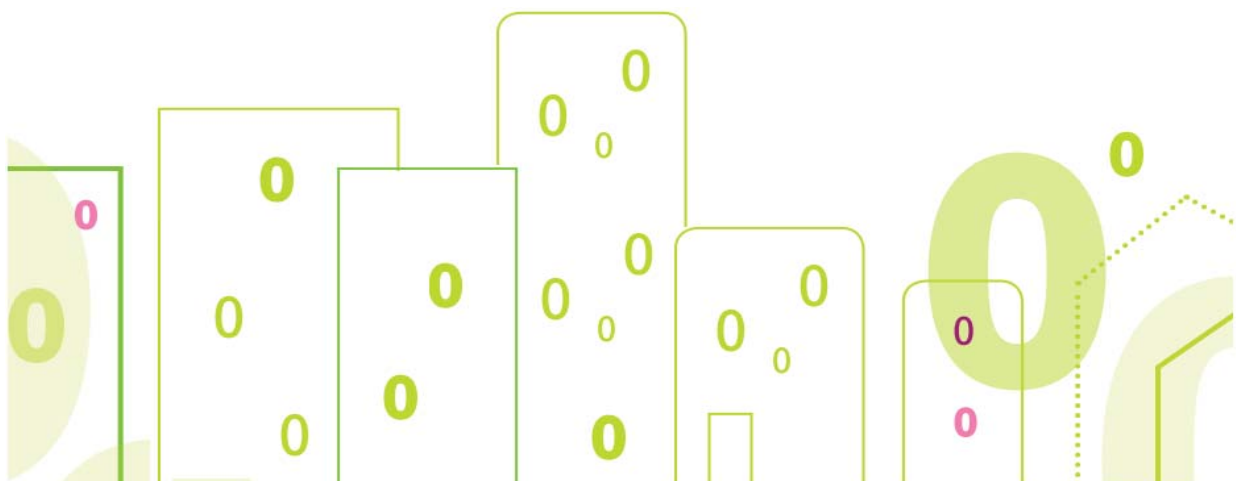
Rossana Zaccaria and Sara Zoni (Finabita, IT)

Anu Sarnet (EKYL, EE)

Eleonora Gaydarova (CAC, BG)

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1 Introduction

The POWER HOUSE nearly-Zero Energy Challenge



“Bringing about change within any sector is a challenge; transforming energy use in Europe’s homes to adapt to new energy landscape is a particularly complex one”.

As Member States work on new definitions and framework to promote nearly-Zero Energy Buildings, Housing Europe, with the support of the Intelligent-Energy Europe program, kicked off the ‘POWER HOUSE nearly-Zero Energy Challenge!’ initiative, to provide a structure for a pan-EU knowledge exchange between social housing practitioners to learn from each other about the practical implications and costs of ambitious energy performance codes and to inform policy makers of the outcomes of this exchange.

This initiative was also designed to guide Member States in the shaping of regulatory and financial frameworks and conditions necessary to ensure that the energy transition is inclusive as well as socially, economically and environmentally sustainable.

The POWER HOUSE Platform help Social Housing Organisations to identify avoidable mistakes and reinvention of the wheel to get on track to meet the nearly-Zero 2015, 2018 and 2020 obligations outlined in the Energy Performance of Building Directive. Furthermore, via an on-line consumption monitoring software, progress on refurbishment rates and reduction in energy consumption and CO2 emissions and renewable energy generation will be entered by local housing organisations and made visible to the public.

The Divided and Cooperative Ownership TaskForce

The work has been organized in four thematic inter-European Taskforces, each focused on the following nearly-Zero energy housing experiences:

- Warm/Mediterranean climates
- Cold/Continental climates
- Divided/Cooperative ownership
- Financing tools and strategies



Incentivising and implementing nearly-Zero Energy strategies in Divided/ Cooperative ownership, particularly in multi-apartment buildings with mixed tenures, requires an adapted financial, legal and organisational framework as well as good communication and marketing plans. Considering the specificity of the housing stock that housing cooperatives are managing, Finabita, the service agency of Legacoop Abitanti, the Italian National Federation of Housing Cooperatives representing 3000 cooperatives from all over Italy took the lead of this Taskforce.

Furthermore, EKYL, the Estonian Union of Cooperative Housing Associations, an independent organization that brings together over 1400 housing cooperatives from all over

Estonia and CAC, the Bulgarian Union of Homeowners Associations representing homeowners in condominium apartment buildings, being among the forerunners in the



management of renovation programmes for housing in individual/cooperative ownership, are also contributing to the works of the Taskforce by providing their expertise to adapt solutions specifically in regions where the housing sector has been largely privatised and has different legal frameworks.

During the 3 years of the projects, taskforce partners have been collecting and analysing data from 15 deep renovation and new built projects, interviewing housing managers, members of the condominium boards, national experts and, last but not least, the habitants of 10 projects' buildings. But that's not all: 3 international workshops have been organized by the task-force, in Madrid, Milano and Tallinn, and 2 study visits in Brescia, Milano, Tallinn and Rakvere. All three project partners have been carrying out a similar work in their own Country, so that at the end it has been possible to compare findings and sum-up general conclusions. The work of the partners has been supported and coordinated with the help of Delsus, company specialized in energy efficiency services. Project partner BSHF took care of producing two reports, one for each international workshop/ study visit.

Lesson Learnt Report

The result of this work is a massive quantity of materials in the form of reports, videos, projects datasheets, energy consumption data monitoring. All this material is easily accessible through the [POWER HOUSE website](#).

The purpose of this Lesson learnt report is to organize and summarize the main outcomes of the taskforce work. The content is organized in chapters, one for each theme which on which the taskforce has been working in this 3 years. We hope this way to facilitate the reader to get a clear overview of the main findings. Each chapter contains direct links to the relevant resources available on line, where thorough information can be found.

Enjoy the reading!

2 Case studies in the Divided and Cooperative ownership TaskForce

nZEC - Energy refurbishment of 17 dwellings in Prof. Giovanni Gorini Street, Sofia, Bulgaria

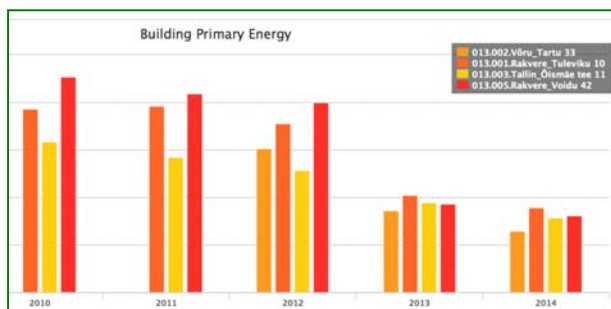


Name of organisation: CAC - Union of Homeowners Associations
Year of finalization: 2011
Type of project: refurbishment
Number of units/dwellings: 17
Country: Bulgaria
Short Description: The project was carried out because of the high price for heating and the uncomfortable indoor climate. The project was implemented within the framework of the National Renovation Program with a 75% of subsidy on the renovation costs. The building construction ...

Icons: Euro symbol, energy efficiency, people, building, sun, and a comment icon with '0 comments'.

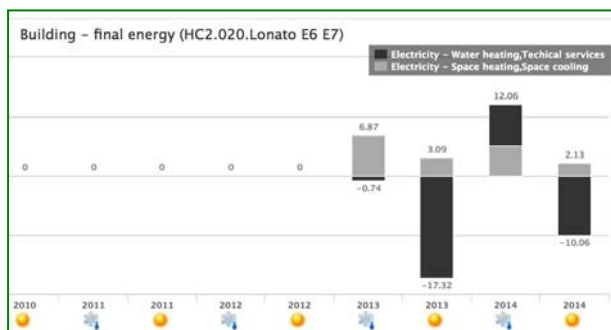
Case studies are an important part of the work done. About 20 renovation and new built projects from Bulgaria, Estonia and Italy have been used to research and demonstrate how low energy and nearly zero energy buildings are and works in practice. The selected projects are all multifamily, divided or cooperative ownership buildings. Detailed information

on the projects can be found on the POWER HOUSE website, where there is a database of low energy and nearly zero energy buildings. The database is organized by Country, projects from Social and Cooperative Housing all around Europe can be found. A general description is followed by a description for several categories of energy efficiency/renewable energy application, so that an advanced search can be done to find out selecting one or more specific categories. A short list of low energy buildings with divided and cooperative ownership can be found in the [section dedicated to the TaskForce](#) on the POWER HOUSE website.



Additionally, the energy consumptions in 5 renovated buildings from Estonia and 5 renovation and new built projects from Italy have been tracked for several years. For this task, the energy monitoring application [HIVE](#) has been used. This web application gives the possibility to access real consumption data for space heating, domestic hot water heating, space cooling and auxiliary electricity including ventilation and production of energy from renewable energy systems.

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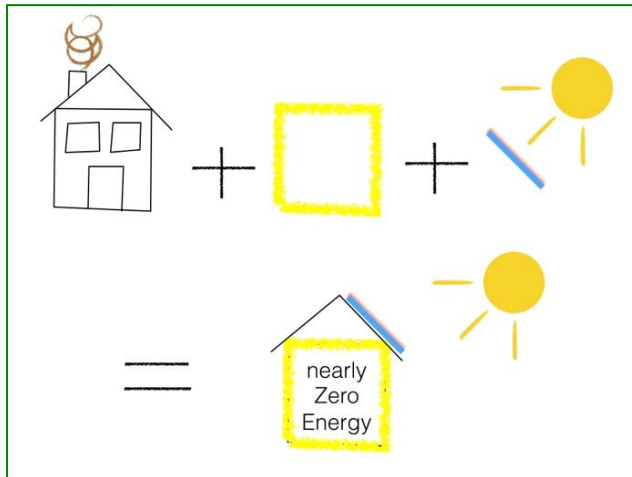


Normally literature offers information based only on *calculated* values, while here is possible to observe how renovation works impact on *real* energy consumption, or which is the real consumption of a new, nearly zero energy building. For example, practical experience from several deep renovation projects in Estonia show that is regular to achieve 50%

and more energy consumption reduction. While in Italy the combination of passive design with rooftop photovoltaic allow to go even beyond nearly zero, reaching buildings with a positive energy net balance.

Visit [POWER HOUSE](#) and [HIVE](#) websites to get a full insight of the projects!

3 Nearly Zero Energy Building standard in Bulgaria, Estonia and Italy



Although impressive progresses have been done in construction technology in the past 15 years, *nearly Zero Energy* is still more a concept than a standard. The European directives have clearly defined the idea: a building which combines energy conservation measures in order to minimize consumption, with the integration of renewable energy systems to produce (part of) the remaining energy need. At local level, member states and regions have started to convert this idea into a standard, which will finally help

professionals and users to realize what nearly zero means, in practice. The state of conversion of the directive has been widely discussed in the document “[TaskForce Needs Analysis & Work Programme including nZEB Legislation Review](#)“, of which here is presented a short summary and update (at February 2015) for Bulgaria, Estonia and Italy.

3.1 Bulgaria

The new Energy Efficiency Bill adopted on first reading by the National Assembly of Republic of Bulgaria on 19th of February 2015 - Art. 26. The *National Plan for Increase of the Number of Buildings with Nearly Zero Energy Consumption* contains:

1. The national definition and technical parameters for nearly zero energy buildings, which reflect the national realities;
2. The national targets for the increase of the number of buildings with nearly zero energy consumption in accordance with the classification of building types under art. 31, paragraph 4;
3. The policies and mechanisms, including financial incentives, for encouraging the construction of buildings in paragraph 2;
4. The period of the plan application.

National Concept Plan for Increase of the Number of Buildings with Nearly Zero Energy Consumption, March 2014. According to the definition proposed in the *Concept Plan*, in order to qualify the building should satisfy cumulatively two regulatory requirements:

- Primary energy consumption of the building (including the electrical appliances) should correspond to class A for energy consumption;
- No less than 55% of the final energy consumption of the building (without the electrical appliances) should be produced from renewable energy sources (RES).

3.2 Estonia

Estonian cost optimal and nearly zero energy building (nZEB) energy performance levels were determined for the reference detached house, apartment and office building. Cost optimal energy performance levels, i.e. the energy performance leading to the lowest life cycle cost according to defined methodology, are implemented into Estonian energy performance regulation as minimum requirements for new buildings. The regulation that came into force since 9 January 2013 includes requirements for nZEB buildings, but they are not mandatory.



Compared to previous requirements, cost optimal requirements improve energy performance by 20%–40% depending on the building type and energy sources used. As uncertainties related to nZEB performance level and cost calculation are generally much higher due to high performance technical solutions not

commonly used and costs not well established, it is recommended to repeat nZEB calculations with possibly refined input data before setting mandatory nZEB requirements.

Estonian primary energy requirements for apartment buildings, which came into force on 9.1.2013:

- nZEB / A / 100 kWh/m² a
- Low energy / B / 120 kWh/m² a
- Min.req. new / C (cost opt.) / 150 kWh/m² a
- Min.req. maj.ren. / D (cost opt.) / 180 kWh/m² a

The National Energy Efficiency Action Plan (NEEAP2) describing the strategy for increasing the number of nearly zero-energy buildings provides that the following steps will be taken to increase the number and area of nearly zero-energy buildings:

- Defining the concept of nearly zero-energy buildings in detail. The initial proposal on the definition of and requirements for nearly zero-energy buildings has been developed but it requires more extensive public discussion. The discussion will be conducted simultaneously with the discussion on the new level of minimum requirements for energy performance of buildings;
- Devisal and application of support schemes to the first public buildings that meet the requirements set for nearly zero-energy buildings. The support scheme will be used to finance additional investments that ensure compliance with the requirements for nearly zero-energy buildings, in new public buildings to be built. The type of support will be decided upon during the devisal of the scheme;
- Information activities are used to encourage the private sector to construct nearly zero-energy buildings.

3.3 Italy

In Italy, there is not yet a binding definition of nearly Zero Energy Building. The Ministry of Economic Development is currently working on a draft of a national decree containing the new minimum energy requirements for buildings. The new decree defines the technical standards to be used as reference for the calculation of the energy performance of buildings and the minimum requirements to be met in the case of new construction, major renovation and energy retrofiting.

The decree will come into force on 1 July 2015 and will concern both public and private buildings, whether new or existing undergoing restructuring. The Decree will also provide a definition "nearly zero energy buildings" by defining the energy requirements relating to it.

4 Financing Schemes



Extensive research work has been done on this topic by project partners, being financing of vital importance for the promotion of nearly zero energy buildings. Results of this work are reported in the document [“Financing nearly-Zero Energy projects and Renewable Energy Sources in Divided and Cooperative Ownership”](#) published in the section dedicated to the TaskForce on the POWER HOUSE website.

Financing schemes can be successful, or a waste of public money. Here some points to keep in mind when thinking of a financing scheme to support energy renovation of existing buildings, with divided or cooperative property:

- **Simple.** In order to be successful, applying for finances must be easy, quick and inexpensive for the applicant. Complicate, time and resource consuming schemes don't (and won't) generate significant results.

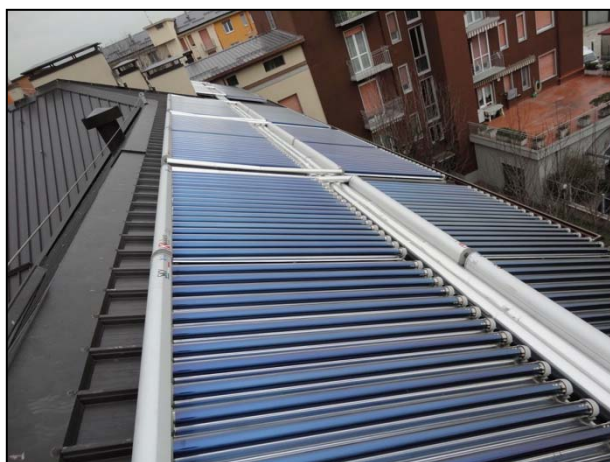
- **Durable.** Retrofitting and construction projects for multifamily buildings typically require few years to be implemented (study, decision, realization). Since the access to the financing is a vital component of financial feasibility calculation, the conditions for applicants must be known from the beginning and remain the same for a sufficient number of years, 3 or 4 years at least.

- **Support to private investment.** In a multifamily building, especially if social housing or cooperative building, and especially where the financial crisis and unemployment are stronger, there will always be some or part of the occupants who cannot effort the investment. Loans must be available to complete the subsidy part of the financing scheme, possibly all integrated in the same financial mechanism.

- **Adequate subsidy.** The percentage of investment costs subsidized must be reasonable considering the actions taken. More should be given when more important savings are achieved. Real achieved savings should be, when possible, verified on the field. Excessive subsidy can have negative effects, such as finishing the resources allocated to the scheme, or increase the price of energy efficiency products.

Between all the studied financing schemes, the *Kredex Reconstruction scheme* (Estonia) appears to be a good example to be taken as model. The *Taxes Deduction for Energy Retrofit scheme* (Italy) is also interesting, although it has been scarcely used for renovation of entire multifamily buildings mainly because it lacks of the loan component.

5 Renewable Energies



Renewable energy systems qualifies make of a “simple” low energy building a nearly Zero Energy Building (nZEB) one! Supported by incentives and financing schemes, integration of renewable energy has become quite popular in most European Countries. Nevertheless, several barriers remain, such as high installation costs and operation/maintenance needs. Support to the renewables sector should continue also in the next years, in order to create a stable economical sector in the continent. Here

our main findings, look the report [“Financing nearly-Zero Energy projects and Renewable Energy Sources in Divided and Cooperative Ownership”](#) published in the section dedicated to the TaskForce on the POWER HOUSE website for more.

- **Widespread technologies.** From the research done, it is rather common to have some sort of RES both in retrofit and new construction projects. Especially if also heat pumps and heat recovery from ventilation are to be considered as RES.
- **Mature technologies.** Several different RES solutions have been available as commercial, fully developed products since a few years now.
- **Simple is better.** Simple systems are generally to be preferred, complex systems requires more maintenance, and consequently more costs.
- **Monitoring.** It is important to monitor the performance of RES in buildings, especially in multifamily buildings, otherwise the effective performance of the system installed could fall, with no one noticing it
- **Information.** Apartment owners should be aware of the RES systems installed, how they work and how they can be operate/ exploit them at the best

Looking at the case studies from the three Countries, several different RES have been used. PV systems are quite common in Italy, where a greater solar radiation is available and also a favourable “feed in tariff” scheme was in place (at least up to 2013). Heat pumps are common in Italy and Estonia, and they promise to become more and more common in future. Solar thermal is used everywhere, being relatively “cheap”; it is used mainly for hot water heating, and it is known to require some maintenance. Finally, Estonia shows some interesting solutions for implementing heat recovery from ventilation in renovation projects, with two different technologies: “decentralized ventilation systems” and “extracted air heat pumps”; both these technologies seems to work fine, increase efficiency and improve air quality.

6 Legislation and Organizational Framework



Divided and cooperative property means that decisions concerning the building must be taken by a large number of people - which is not easy - of course. In the report "[Legal & organizational framework and Communication & marketing of nZEB in Divided and Cooperative Ownership](#)", published in the section dedicated to the TaskForce on the POWER HOUSE website, the situation in Bulgaria, Estonia and Italy has been investigated. Here the main conclusions:

- **Clear rules.** Clear condominium law, defining rights and duties of the owners and the rules for approving energy renovation project proposals. "Condominium" should be a legal entity, which can apply for finances, order and pay renovation works and other services.
- **Service providers.** Development of business models, which can help gathering the necessary financial resources to initiate the renovation project by mean of a third party (ESCOs).
- **Qualified workers.** Presence of experienced professionals and workers for designing and implementing the renovation projects, not forgetting the crucial role of "intermediation" between the owners and introduction of the positive consequences of a renovation project. Design energy retrofit is not an easy task and a good audit/ project/ construction are essential to achieve the expected results in terms of energy savings at affordable costs.
- **Qualified support.** Presence of third parties such as sectorial association and energy agencies, which can support the condominium to start the process and meet the right project partners. Owners and eventually the building manager normally do not have enough competence to lead alone the long process, which can lead a community of owners to decide for a deep renovation project.

The experiences reported in this deliverable show that legislative developments are happening in all the 3 Countries: the new condominium law (2009) in Bulgaria, the new regulation (2018) expected in Estonia, the new condominium law (2013) in Italy

One interesting outcome of this work is offered by the comparison of the Estonian and Bulgarian situations, two countries with a common background from the Soviet time, but with different developments. Estonia managed in about 20 years to activate a process of refurbishment of its existing housing stock, while in Bulgaria more time will be needed. One reason of this difference lays in the more advanced condominium law existing in Estonia.

7 Market and Communication



Project partners have described in the report “[Legal & organizational framework and Communication & marketing of nZEB in Divided and Cooperative Ownership](#)“, published in the section dedicated to the TaskForce on the POWER HOUSE website, different aspects of the importance of a good communication in order to promote low energy projects.

➤ In Bulgaria and Estonia the issue concerns almost entirely the refurbishment of existing-buildings, while Italy reported mostly about new built, where communication is a vital marketing asset.

➤ Bulgarian Union of Homeowners Associations reports the importance of the current National Program “Energy Renovation of Bulgarian Homes”, and the importance of demonstrating to end users (apartment owners) that the program is worth and the funds are

fairly managed by the State. So the main objective of communication should be building trust among the owners towards the program and the opportunity to form an owner association and undertake deep renovation works.

➤ Estonian Housing Association also reported the importance of communicating correctly the opportunities offered by the National KREDEx Fund, but also stressed the importance of a good communication between the actors involved in the renovation project, in particular the management board of the apartment association and the owners. Crucial appears to be the initial presentation of the advantages and implications of the renovation projects at the very beginning, where the involvement of an experienced energy expert with good communication skills can make the difference.

➤ Italian Housing Cooperatives work also with new construction buildings. This requires good communication and good marketing between the provider and the potential buyer. Energy efficiency is a quality appreciated by the public. Unfortunately the energy performance certificate alone is not always enough to convince the potential buyer of the quality of the building. For this reason more and more housing cooperatives have started in the recent years to adopt voluntary protocols for design of low energy houses, such as CasaClima, or Passive House, which are generally well known and appreciated by the public. Other cooperatives have started to guarantee the result in terms of max. energy consumption of their new houses, in order to create confidence towards the potential buyers. All these actions are interesting, because they bind the cooperatives to improve their construction practices all the time.

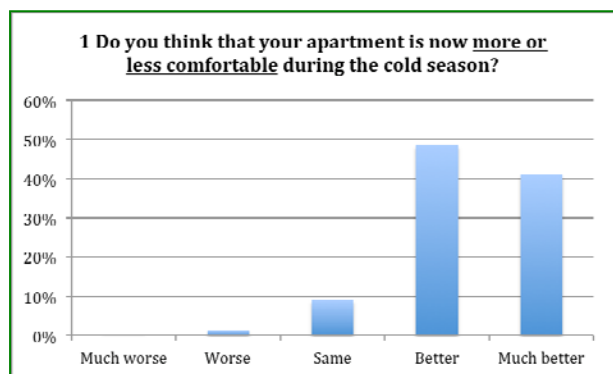
8 Cost Effectiveness



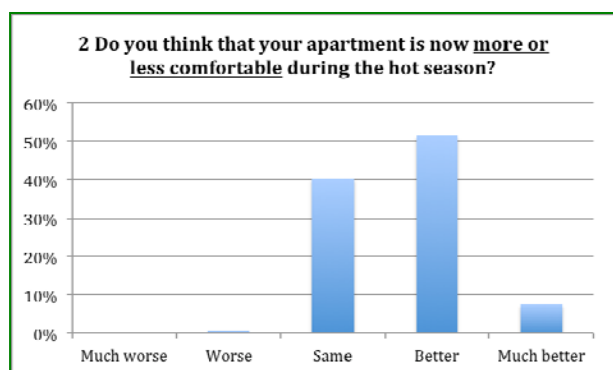
Is it worth to refurbish a building or to construct a new one as a nearly Zero Energy one? Which is the “optimal” level between investment costs and energy savings? An extensive research work published on the report “[Cost-effectiveness of nZEB in Divided and Cooperative Ownership in practice](#)” has been done. The report investigated different aspects of economical feasibility of deep energy renovation and construction of nearly zero energy buildings in the divided and

cooperative property context in 13 projects. For the final user, economical feasibility is of vital importance, meaning the ration between investment costs and reduction of energy costs. But what happens to the property value of a renovated building? And should also comfort (and healthiness) of the spaces where people live be considered in a feasibility analysis? Main points, which emerged from the work, are:

- Timing for energy renovation is crucial: pay back time for deep renovation of building components which *actually* need to be renovated is about 50% of the expected lifetime of the renewed components, making an *energy* renovation more convenient than a *conservative* renovation. Too high subsidizes could alter this relation, making economically convenient to renovate building components which have not yet entirely exhausted their lifetime.



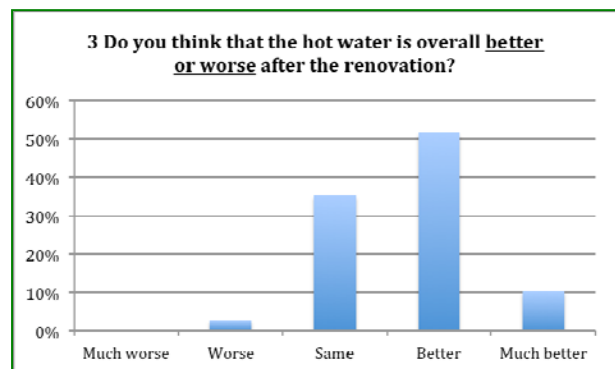
In any case the increase of property value is always (much) bigger than the extra



- The research on the increase of the property value gave surprising results, as in many cases the value of the property after the renovation/ new construction compared to the basic energy standard building, shows that the increase of the property value is almost equal, or bigger, than the money invested for the energy measures. This is particularly true for properties in larger cities, less for projects in smaller centres. In any case the increase of property value is always (much) bigger than the extra cost for making an *energy* renovation instead of a *conservative* one. Instead of costs, it would be more correct to talk about investment when referring to energy renovation of buildings.

- User satisfaction questionnaire shows that 90% of the users think that in winter comfort is better or much better after renovation. Thermal insulation was

generally the main target of the renovation. 60% of the users think that summer comfort and domestic hot water service are also better or much better after renovation. While only less than 2% (in the worse case) of the users express a negative opinion about comfort of the building after the renovation. Also noise insulation is a positive “side” effect of the renovation, which is highly appreciated by the users.



➤ It is not so easy to state that part of the potential energy savings for space heating are spent for a higher internal temperature: for example in some Estonian cases with central heating, previous the energy renovation the heat distribution was unbalanced, leading to high temperatures in some apartments.

In conclusion, expected saving on energy bills should NOT be the only parameter toward which economical feasibility, and also cost optimality, should be measured. There are other parameters, such as the actual need for renovation, the expected increase in property value and the benefits in terms of indoor comfort, which should be considered and appreciated in the evaluation.



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