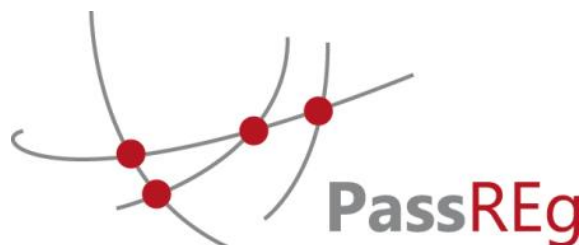




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# IEE PassREg

## PASSIVE HOUSE REGIONS WITH RENEWABLE ENERGY

### Success Model

### Associated Aspiring Regions in ITALY

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## INTRODUCTION

The **Success Model** is a description of the terms, documents and actions that would ensure accelerated implementation of "nearly zero-energy buildings" ("passive buildings") throughout the considered regions. For this purpose, it is accompanied by a clear and measurable **interim and final targets** and timetables for achieving them, which are represented by a **Roadmap** (Schedule). It describes the successive steps to develop patterns of success (Success Model) and timetables for achieving them.

Items included in the Success Model are described in two horizons - today (baseline) and future state. The description of today (baseline) policies and practices presents results achieved by now. The description of future policies and instruments outlines the means by which to achieve predetermined objectives of this project and in a wider scope – the European and national climate and energy efficiency building policy:

**from 2019/2021, new buildings will be designed and constructed according to the "nearly zero-energy" standard.**

The description of the baseline has to be succinct and precise, and the introduction of new policies and instruments - explained and justified in enough detail. If the description of the baseline for some of the pre-marked points can not specify a particular activity, this must be reported, in order to make it clear what is the starting point of the new Success Model of the region (municipality). The short presentation of the baseline (already prepared on the basis of pre-distributed model structure and content) can be used at this point.

It is strongly recommended for the improvement of existing Success Models and the compilation of new ones that the regions involved in PassREg project actively use the experience of pre-selected pilot Front Runner Regions. The descriptions of their Success Models provide detailed information for all project partners.

**Note:**

***In terms "nearly zero-energy building" and "passive building" used in this text is put the same meaning. PassREg project aims to establish the "passive house" standard of as the basis for the definitions of "nearly zero-energy building", which are currently under development and are to be adopted in any member country of the European Union.***

In Italy some regions started process to become passive house regions with renewables energy, aspiring to examples, solutions and models developed in the PassREg project. This could be relevant for the whole mediterranean area, with its specific features and opportunities.

Catania district, in Sicily, shows important developments are moving from a **bright exemplary project** where zero energy target is reached by adopting Passive House standard and integrated renewable energy systems. This residential building made to rise attention of many people in building sector and among policy makers. They can see an affordable solution to realize a zero energy building with pleasant architectural aspect. Many people are taking part to events and open-door visits presenting it.

These are increasing awareness and knowledge both for common users both for designers and builders, and **requests of possible new passive houses** projects are coming for new buildings and renovations. Building sector operators can catch the **opportunity in the market** of high comfort and quality buildings with very low energy costs, with more stable and successful projects despite economic crisis.

Training activities are starting particularly for new passive house designers with a dedicated **post-degree master** under developing in Catania, to give high level knowledge in ecologic and zero energy building with an holistic approach.

The same steps can be seen in Lombardia region, particularly in Lonato del Garda, a small town where two different buildings were recently built according passive house standard with renewables, representing important examples respectively of zero energy single family house and an apartment block for **social housing**, particularly relevant to provide low costs apartments for low-incomes families.

Many official visits were organized to directly present these beacon projects to **building users, designers** and other stakeholders. Particularly in the single family house in Lonato, many sessions were held for **young students** who demonstrated high interest for passive house solutions. The buildings was presented also by local media and televisions. In other regions new beacon projects are under development, as in municipality of Aglientu where a passive house is **now in design phase** to be built in the pleasant landscape of a strategic touristic area in the north of Sardinia.

In all italian PassREg aspiring regions, involved policy makers are evaluating to consider passive house features in their **local building regulations** and in **possible tenders** for new buildings and renovations in public sector. For instance this was already happened in San Giovanni Lupatoto, a small town near Verona and Lonato, where municipality are building a **public school** according passive house standard.

In addition to the city of Cesena, which is active as partner in the PassREg project, the following other regions are involved with the guide of the *End-use Efficiency Research Group* – [www.eerg.it](http://www.eerg.it) - of Politecnico di Milano:

- Catania district and Sicily region
- Lonato municipality and Lombardia region
- Aglientu municipality in Sardinia region
- San Giovanni Lupatoto municipality (Verona)
- Pesaro e Urbino district
- Foggia district
- Cesena municipality - PassREg Partner

# 1

## ENERGY AND BUILDING POLICY

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This section is intended to present the long-term local policy on energy efficiency in buildings and political tools used for its formulation and implementation. On this basis the attitude to the new "nearly zero-energy building" standard is outlined and local policy objectives and standards are compared with the adopted national framework.

### National framework

#### Baseline

2010/31/EU European Directive dated 19th May 2010 on energy performance in the construction industry, introduces the definition of "Near Zero Energy Buildings", leaving each Member State free to identify the essential steps for their implementation and diffusion in order to achieve fixed efficiency objectives.

Italy, as any other State, had to absorb the Directive in its national law within 9th July 2012, setting up and applying minimal energy performance's standard to new and existing buildings and ensuring buildings' energy performance certification, to guarantee that every new construction within 2021 shall be "Near Zero Energy Buildings".

The adoption was achieved with one year delay, assuming the nature of urgency because of a procedure for infringement against Italy: the 3rd August 2013, Law No. 90 was published on Gazzetta Ufficiale, becoming effective the day after and converting No.63 Legislative Decree of 4th June 2013, "bringing urgent disposals for the implementation of the 2010/31/UE Parliament and Council's EU Directive dated 19th May 2010, on energy performance in the construction industry for the definition of infringement's procedures started by the European Commission (...)" that evolved the 19th August 2005's Administrative Order No. 192.

The Decree provides for the settlement of an Action Plan by 30th June 2014, addressing to the enhancement of "Near Zero Energy Buildings" and, within it, to the identification of primary energy consumption's indicators (kWh/m<sup>2</sup> per year) and limits to respect in order to join this category, as well as policies and financial procedures expected to promote NZEB. In addition, starting from the 31st December 2018, new buildings being property or occupied by Public Administrations must be Near Zero Energy Buildings, whereas from the 1st January 2021, this feature will be apply to any new construction.

The Decree also mentions duties regarding buildings' energy certification that must be supplied in case of selling, leasing, free transfer and for new or subjected to important restoration buildings, so that citizens can consider and compare different buildings and choose on the basis of buildings' global energy performance, energy efficiency class, heating or cooling consumptions and on other useful information on the expected building's operation.

The Decree also indicates that for nZEBs and other buildings the energy balance have to be calculated on monthly base and separately for each energy carrier used in the considered

building: so the balance between the energy demand and the on-site energy production by renewable energy sources will be calculated for each month and each energy carrier.

Despite any unique definition of “Near Zero Energy Building”, there are in Italy some energy efficient and passive buildings; also targeting the requirements introduced by the Decree, it is essential for Public Administrations to define a strategy on how to operate in order to achieve these objectives, now.

Looking backwards to the Italian legislation on energy issues, 1991’s Law No.10, on how to carry out the National Energy Plan referring to the rational use of energy, energy saving and the development of renewable energy sources, put at the time Italy in advance to the other countries, as the law called for a number of measures addressed to energy saving never provided by any other national legislation before. Among these actions, the obligation for Regions and autonomous Provinces to redact Regional and Provincial Energy Plans connected to the use of energy sources. Moreover, Law No.10 stated a series of rules to contain building’s energy consumption, forcing to design and build every public and private buildings in a way to minimize consumptions of thermal and electric energy and imposing to Public Administrations to satisfy their properties’ energy requirements with renewable or assimilated energy sources and to commit to buildings’ energy certification.

Regarding buildings’ energy performance, 2005’s Legislative Decree 192/05, adopted the European Directive 2002/91/CE on building’s energy performance. The core of this Decree is the definition of criteria, conditions and procedures to improve buildings’ energy performance in order to enhance the development and integration of renewable energies and to support the national goal of minimizing greenhouse gas emissions, as foreseen by Kyoto Protocol, and the regulation of a method to estimate buildings’ energy performance during design and certification phases and the implementation of related minimum requisitions.

The Decree regulates many essential aspects connected to the national energy policy and looks for the achievement of important goals as saving energy and greenhouse gas emissions.

Particularly, the 16th December 2002’s European Directive 2002/91/CE includes four main elements:

- a common methodology to estimate buildings’ integrated energy efficiency;
- minimum energy performance’s requirements for new and existing buildings subjected to massive renovation;
- certification systems for new and existing buildings and energy performance certificates and other relevant information’s exposure in public buildings. Certificates must be not older than five years;
- boilers and centralized air conditioning systems’ periodic inspections and evaluation heating systems with boilers older than 15 years.

President of the Republic’s Decree no. 59 of 2nd April 2009 enabled article 4, section 1 of 192/2005’s Executive Decree, that empowered one or more Minister of Economic Development’s Decrees to define an estimate approach for energy performance and renewable energies use’s requirements.

The 28th December 2012’s Ministerial Decree, on the support of thermal energy production from renewable sources and little intervention of energy efficiency, introduced an incentive program that awards those subjects excluded from other incentive systems, public

administrations above all, with a grant that could be equal to 40% of costs incurred, depending on the intervention. This Decree introduces a subsidy that might be essential for those public administrations forced to stop the realization of energy efficiency interventions in their own properties because of unbearable costs.

### Success Model

The main national document on energy policy, defining objectives and priorities, is the National Energy Strategy (SEN), approved by Ministerial Decree in March 2013 and oriented to reduce energy costs, to supersede energy dependence on foreigners' countries and to ease the sustainable economic growth thanks to the development of an energy sector. Since 20 years passed after the last National Energy Strategy, this planning document was intensely expected.

As stated on the Ministry of Economic Growth's web-site (<http://www.sviluppoeconomico.gov.it>), actions suggested in the energy strategy - within two different deadlines – 2020 and 2050 – represent energy no more as an economic factor of disadvantaging competition and burdening Italian family's budget, aiming at establishing a road map that allows to enhance environmental standard and to strength the security of supply, thanks to considerable investments.

The implementation of the suggested strategy will permit a step-by-step but significant system's evolution and to cross "20-20-20" European goals, with the following results expected by 2020:

- significant energy costs' reduction and progressive accordance to wholesale prices at European level;
- exceeding all 2020's European environmental goals. These include: greenhouse gas emission's reduction of 21% compared to 2005 (EU goal: 18%), primary consumptions' reduction of 24% compared to performance inertial (EU goal: 20%) and the achievement of 19-20% renewable energy effect related to gross final consumptions (EU goal: 17%). Particularly, renewable energies are expected to become the main electricity sector's source together with natural gas with an incidence of 35-38%;
- more security, bigger system's flexibility and less dependency. Dependency from other countries is expected to decrease from 84% to 67% ;
- Positive impact on economic growth thanks to investments both on green and white economy (renewable and energy efficiency) in traditional sectors (electricity and gas networks, storages, hydrocarbons development). These are private investments, partially supported by incentives and with a considerable impact on the system's competitiveness and sustainability.

To achieve this goals the strategy will be articulated in seven different priorities with specific, existing or on going, effective measures. The following measures concerns energy efficiency and near zero energy buildings:

- the promotion of Energy Efficiency, ideal tool to pursue all those goals above mentioned;
- the promotion of a competitive gas market, integrated with Europe and with prices aligned to it;
- sustainable development of renewable energies, for which the aim is to exceed European goals ('20-20-20'), containing at the same time bills expenditures;

- development of an electricity market fully integrated with the European one, effective, with competitive prices and with a step-by-step integration of renewable production;
- Support to research and technological development activities, functional to enhance energy efficiency, renewable energies and sustainable use of fossil fuels.

Among the interventions in order to achieve these goals, there are: to enhance the ESCo model; to strength controls and fines within laws, to introduce financial relief to promote researches and technological innovation, to raise consumers' awareness on energy efficiency issues, to reinforce compensation's mechanisms and specific guarantee funds.

Italy put the promotion of energy efficiency among its national energy policy's priorities, associating to this the pursuing of energy supply's security, energy costs saving for enterprises and citizen and the promotion of innovative and green technological chains, also in relation to the reduction of climate-change emissions.

So far at the beginning of 2015, starting from the No.63 Legislative Decree of 4th June 2013, the Government are developing the national regulation with further detailed requirements and calculation method for new and renovated buildings according the EPBD requirements and methodologies.

## Political will at the local level

### Baseline

In the considered regions the policy makers show interest in solutions and strategies of the passive house standard. They consider relevant the projects built in Europe and worldwide as real examples of worth and ambitious building solutions and supporting policy strategies.

Also for these reasons, the involved local administrations follow with interest the beacon projects in their regions and they support them in different ways, as for the municipality of San Giovanni Lupatoto (Verona), in Municipality of Lonato (Brescia) or in Catania district in Sicily.

In addition to the already completed beacon projects, we can see also one completed very recently, very interesting due to the fact it's a public school built according passive house criteria. The project also plan to install a photovoltaic system which will be very well integrated in the architecture of the building and will partly cover the very low energy demand. This passive house certified school were built according the public tender of the municipality of San Giovanni Lupatoto.

### Success Model

#### **Getting ideas from the real examples of local administrations already did it with success**

Front runner regions (FRR) are regions and municipalities which show real success models in place for the implementation of nearly zero energy buildings (nZEB) adopting the comprehensive passive house criteria and strategies. Thanks to these, in few years the front runner regions actually have reached important targets visible as hundreds of passive house



buildings recently built. These are very high performance but common buildings of all shapes and types (residential, social housing, office, school, care centres, sport facilities, ...). This regions show in practice successful results both for real buildings and building market developments both for the supporting strategies, solutions and measures in the political field. These blighting examples can offer complete set of solutions to be adopted also partially in each other regions. These solutions and models were deeply described, analysed and summarized in many documents and web-site of the PassREg project - [www.passreg.eu](http://www.passreg.eu). Sometimes these successes could produce astonishment but they are real and affordable for very different regions. The targets reached and results achieved in other regions (so called *Aspiring Regions* in the project) which are starting now with this process toward nZEB and passive house strategies, demonstrate that the technical and political solutions can be successfully adopted also in other regions, and also new and creative ones can be developed and used.

### **Passive houses as a crucial and suitable solution in strategic energy plans for effective actions**

Passive house strategies and standard mean a clear set of quantitative requirements, which can lead design and construction activities to reach actual nearly zero energy buildings, proved with a complete quality control procedure and on-field tests. Many monitoring campaigns of energy and comfort performances of certified passive house all over the world demonstrate quantitatively the high performances and the very low energy demand which passive house really reach as it's estimated in the design phases. This made passive house requirements as a very useful and important opportunity to be requested in local policy decision acts, local energy plans and building codes. Passive house requirements are clear, completed, quantitative and measurable, from technical point of view they can easily insert in local regulation documents, directly as they are or with intermediate steps. They are also proved and ambitious enough to lead actually towards zero energy buildings.

### **Passive house targets in local policy decisions are affordable and feasible from now and with intermediate and constant steps in a coherent long-term vision**

It's possible to insert now the passive house requirements in local building codes, public tenders and policy decisions, as it is happening in regions and municipalities in Europe as Hannover (Germany), Brussels Capital Region (Belgium), Tyrol (Austria), ... . But it's also possible to adopting passive house requirements in regulations and tenders by intermediate steps with intermediate quantitative requirements or initially involving only some building types following a coherent and effective medium and long term strategies to reach complete passive house solutions. Some municipalities in Italy already are doing these, for examples adopting the passive house targets in the local building codes (*Regolamento Edilizio*) as quantitative requirements needed to reach financial supports. For example is the case of Municipality of Muzzano (Biella) and Municipality of Botticino (Brescia).

### **The market opportunities of high quality building with Passive House solutions**

Passive house strategies and set of requirements lead to high performance buildings with high environmental value and the best indoor comfort conditions, due to optimal thermal insulation level of building envelop, external movable solar shading devices, very good indoor air quality thanks to effective mechanical ventilation with heat recovery systems. For

this reasons, passive house new buildings and refurbishments can represent very attractive solutions for the construction market, which can improve its quality and the level of product. The high quality and the profitable life cycle cost of passive houses can make increase the building market activities and related employment at local and national level.

### **Passive house strategies as complete set of requirements easy to understand and to be controlled by end users / citizens**

Passive house concept<sup>1</sup> is quite easy to be understood both by expert both by building end-users. Passive house standard as comprehensive set of quantitative requirements and quality assurance method represents also a useful way to ask for high performances buildings and nearly zero energy buildings in public procurement procedures and in private market to give reliable guarantees to clients and buildings occupants.

### **Passive house solutions are suitable also for the strategic sector of buildings renovations**

To reach energy savings and environmental targets at local and national level, it's crucial to adopt energy efficiency and renewable energy measures in the renovations of existing buildings. Passive house solutions are suitable and proved also in refurbishments projects, as it's demonstrated by many completed renovations. Refurbishment according passive house principles and adopting suitable components can be done also following a step by step approach with intermediate interventions at passive house level, as it's also demonstrated and analysed in the european research project EuroPHIT - [www.europhit.eu](http://www.europhit.eu).

## Local climate and sustainable energy policy

This subsection is intended to outline the general policy of the region (municipality) in relation to climate change and sustainable energy on which specific policies on low-energy and passive building will be further designed. For each region, specify the names of the relevant policy documents in accordance with national and local laws and established practices.

### Baseline

In some regions and municipalities climate and sustainable energy policies have been developed and put in place. Some other regions are starting now the process. Of course national legislations and european targets until 2020 and 2030 (now under discussion) are triggering and pushing the development of this kind of policies at local level. Often, about building sector, strategies and requirements are adopted with less stringent and less complete targets respect Passive House solutions. The successful example from PassREg can help to inspire, develop and enrich the framework of local climate and sustainable energy policies.

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<sup>1</sup> Further details on the Passive House requirements are presented here [http://www.passiv.de/en/02\\_informations/02\\_passive-house-requirements/02\\_passive-house-requirements.htm](http://www.passiv.de/en/02_informations/02_passive-house-requirements/02_passive-house-requirements.htm)

### Success Model

Local climate and sustainable energy policies in general should have a **long term and coherent vision**. Important objectives and main strategic elements should be shared and committed by main persons and parties involved in the administrative and policy processes at local and national level. The successful process could start from a strong political will which can then generate policy measures, successes and consensus. Then the political process should develop in adequate intermediate steps, implemented with constancy. For example we could consider the successful case of **Hannover** where in early 1990es (and also before) the Municipality started the policy process leading to the actual results also in terms of nZEBs and passive houses wide spread and relevant energy savings in building sector. Or also the success experience of **Brussels**, where since 2004 the regional government started a very fast and effective process to implement passive house requirements in building regulations, in mandatory way since 2015 and supported by some policy measures before. We can recognise two different kind of successful process about time table, more constant and continuous in Hannover while faster during the last few years in Brussels, but in both cases the path moved from a strong and coherent political will.

Local policies should develop strategies to arise care about climate protection and sustainable energy actions in all citizens, implementing **effective information campaigns** and communication strategies on the planned solutions. We recognize as crucial those information and communication activities addressing **demand-side** players, building occupants, owners and tenants, who can increase and improve the quality of the demand in the building sector.

Policies measures can be driven and consensus can be increase by arising attention on successes and good experiences of **real exemplary buildings** completed in the regions. This is the approach used in Brussels region with the large programme implementing exemplary buildings and this is the strategy of passive house beacon projects in PassREg.

Sometimes local climate policies express too generic objectives and avoid quantitative requirements also in construction sector. This could not be effective to lead to real results. The Passive House standard represents a high quality and proved design strategy with a complete set of quantitative requirements on building components and performances. This quantitative indexes and related quality assurance procedures can be explicitly required in the local policy measures. This could allow to express **precise commitments and requirements as passive house solutions, avoiding too generic requirements**.

The implementation of Passive House requirements and the use of related high performance components can **avoid the lock-in effect** consisting in adopting now solutions and components with low performances, which will became obsolete soon.

Passive House strategies focuses mainly on energy efficiency and related issues. This in itself has a high environmental value, but in addition Passive House requirements can be integrated with further targets and limits aiming to **overall sustainability goals**, as other environmental and sustainability labels and assessment method for buildings.

## Local policy instruments for energy efficiency in buildings

The Passive House standard represents a high quality and proved design strategy with a **complete set of quantitative requirements** on building components and performances. This **quantitative indexes** and related **quality assurance procedures** can be explicitly required in the local policy measures. Provide a comprehensive and reliable technical source, which

policy makers can easily use to complete and improve their regulation and policy documents.

Relevant **instruments are already available and diffuse** to implement local policy plans and regulations at regional, district or municipal levels. Many of these instruments are mandatory and requested by national and regional laws. And their structures and typologies are already well known by policy makers and consultants. These instruments are different and covers strategic planning, regulations and codes for buildings construction, urban planning, guide lines for public tenders and procurements, etc.. Here below we list important available instruments, where the Passive House set of requirements can be well integrated.

- Sustainable energy action plan (SAEP) and Covenant of Majors commitment (*Piano d’Azione per l’Energia Sostenibile - PAES*)
- Municipal energy plan (*Piano energetico comunale*)
- Regional energy plan (*Piano energetico regionale*)
- National energy plan (*Piano energetico nazionale*)
- Public tenders asking explicitly for new buildings and renovations according the quantitative passive house requirements
- Regional and national guidelines for public tenders asking explicitly for new buildings and renovations according the quantitative passive house requirements
- Municipal building codes (*Regolamento Edilizio*)
- Regional and national guidelines for municipal building codes and exemplary documents / annexes available to be integrated in this instrument at local levels
- Urban plans documents (*Piano Regolatore, Piano di Governo del Territorio, etc.*)
- Municipal development plans for settlements (*Piani di Intervento, Piani Attuativi, Documenti di Inquadramento, etc.*)

All these instruments are suitable to be easily integrated with overall passive house requirements, which can be expressed both as **energy performances** (energy need for heating and cooling, total primary energy demand, etc.) and **comfort requirements** both as limits on **building and systems components** (envelope thermal transmittances, glazed surfaces properties, airtightness level, efficiency ratio of heat recovery, etc.). Also the passive house **calculation method** and the **quality assurance procedures** can be easily required in the policy instruments.

In addition to the complete set of quantitative requirements of the passive house strategies, in the policy instrument should be also fixed some general but important requirements with the aim of

- **optimizing the solar gains** in the energy balance of buildings to guarantee high indoor comfort conditions and low energy demand (reaching maximum solar gains in heating season and minimum in cooling season),
- **thermal mitigation of local microclimatic conditions**, reducing urban heat island effects and using trees and vegetation in the buildings surroundings to provide summer shading to buildings.

For this objectives criteria and limits could be indicated about

- distances between buildings,
- main expositions of building and particularly of glazed surfaces of buildings,
- presence of vegetation, plants and trees also as *green infrastructure* in the city.

We want to stress the strategic importance of **exemplary buildings** for their high quality level and energy performances, and particularly new buildings and renovations completed according the passive house requirements. They can represents real **case studies** and **beacons**, which clearly demonstrate zero energy buildings are feasible and affordable, they provide better indoor comfort conditions with much lower energy demand and costs respect than a common building. Beacon projects can produce trust to start a successful process engaging all the stakeholders.

In some regions and municipalities, it could be that buildings were already built according passive house principles, anticipating local policy instruments asking for this. In these cases beacon projects could be already available as possible starting point of the process. In order to check this, an **official census of passive house and zero energy buildings** could be carried out by regional or municipal administrations, as the Municipality of Cesena did as one of the first steps during the PassREg project. For this another relevant sources is the official international passive houses database, containing detailed information on all certified passive house and other buildings checked by using passive house energy balance calculation method, in the world - <http://passivhausprojekte.de/index.php?lang=en>.

In regions/municipalities, first beacon projects and exemplary buildings should reach wide visibility and diffusion among the citizens. In order to prove their actual high quality and energy performances, **detailed monitoring campaigns** of energy demand and comfort conditions should carry out in rigorous and scientific way. Very detailed monitoring activities should be done in the few beacon projects built at the beginning of the process. **Quantitative results** from the monitoring campaigns should be properly disseminated to technical experts (designers, consultants, craftsmen, etc.), people involved in the policy decisions making, citizens and building users.

This could improve the consistent knowledge of passive house building toward nZEB and **provide evidences** of the important potential and opportunity to spread passive house strategies in new and existing buildings.

Then in addition of these detailed monitoring campaigns, more general and **extensive monitoring campaigns** should be carried out on a increasing number of exemplary buildings, in order to check quantitatively their performances in terms of energy demand and production from on-site RES and of comfort performances.

In addition to the detail monitoring of the initial exemplary buildings, a suitable **mechanism for quality controls** of new and existing buildings interventions should be required and organized in order to guarantee that the energy performances and components requirements foreseen in the design phase will be really reached in the buildings occupancy. Procedures for quality controls and checks are already developed and adopted in the passive house strategies, as the blower door test to measure the air tightness of the building envelope.

In the local policy instruments, passive house requirements can be adopted directly as complete set of targets and limits for all building types, or they can be adopted in **intermediate steps**. A gradual adoption of passive house strategies could be implemented in the following kind of steps and elements:

- passive house requirements initially could be put only for **selected building types** as
  - public and/or private
  - according buildings use: residential, office, school, tertiary, etc.
  - only for buildings of selected new settlements
  - buildings with conditioned floor surfaces greater than certain thresholds
  - new buildings and/or renovations
  - deep and/or partial renovations.
- Passive house quantitative limits and performances could be requested by regulations through **intermediate values** which will be improved and become more stringent progressively in time: the path towards limits suitable for passive houses could start from fixing values slightly better than the regulations now in force. Then sets of improved more stringent values could be fixed with an established time table (e.g. every two years). In this way local regulations could reach passive house limits and targets at the end of a reasonable process in which all actors involved can be follow the steps.
- Urban plans or related tenders for settlements with several buildings (more than one) should require a **mix of passive house buildings and lees energy efficient ones** (e.g. energy class A or according the basic regulation in force). This could help investors, designers and construction companies to approach more gradually the passive house principles. In addition this could open more opportunities and wider possibilities to choice in the building market.
- Implementation of passive house strategies directly in complete way or through intermediate steps could be **supported by proper policy measures** (incentives, tax deductions, preferential loans, ...) which can follow in dynamic way the process time table, varying in function of progresses.

All these solutions described here and in the analysis of the PassREg project through the Europe can be relevant also for **the renovation of urban areas** previously occupied by old industrial structures now not in operation anymore. This is the case of many urban area in Italy, called *aree dismesse*, in case new buildings will be built on part of these areas. Interesting examples of Passive House solutions adopted on large scale in this kind of areas can be seen in Antwerp.

The comprehensive set of requirements of the Passive House standard is already suitable for complete description of high quality nearly Zero Energy Buildings, as explain here.

For a complete and more precise description of renovations targets and limits toward nZEB levels, we think it's crucial considering more complete indexes for **description and ranking of buildings and NZEBs** as foreseen by EPBD. This set of indexes, presented below, could

describe in quite comprehensive way the building performance in terms of energy efficiency and comfort. These represents also indexes which can be easily and directly understood and interpreted, avoiding or reducing the use of some kind of indirect or normalize indexes, on which we could not have direct references for comparison.

- **heating and cooling energy need** (which give account of the entity of heat losses/gains via the envelope and ventilation), considering **a performance part and a prescriptive part on energy needs and energy uses**:
  - Energy needs for heating, cooling and hot water and energy use for lighting (and optionally energy use for ventilation, auxiliaries and plug loads)
  - This has the advantage of not requiring any weighting factors (performance part).
  - Additionally, a related prescriptive approach (e.g. U-values for windows and walls, g-values for solar protections, air tightness limits and control tests, (built-in) lighting installations, etc.).
  - This approach is used for instance in Norway regulation (2015), Minergie label (Switzerland), Passivhaus label, Brussels regulation.
- **an index of long term comfort conditions** (which gives account of both **winter and summer comfort** conditions integrating the hourly conditions over the entire year) for instance as indicated in **standard EN 15251**.
- an index evaluating grid stress induced by **temporal mismatch** of energy generated onsite or nearby (by RES, high efficient cogeneration, etc.) and building energy demand
  - a **“load matching index” or other similar indices** in the end showing the share of self-consumed locally generated renewable energy - **calculated with time steps of a month , day or (preferably) hour;**
- an index based on **net yearly primary energy demand**

## 2

# ECONOMICS AND FINANCE

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This section presents the economic indicators and existing tools to promote energy efficiency before the formulation of the model and highlights economic goals and indicators of the already established Success Model of the region (municipality). Financing instruments in use are shown and guidelines for new forms of financing are outlined to accelerate the entry of “nearly zero-energy buildings” in the community.

## Economic levers

### Baseline

Since years, the Italian system already provides for diversified systems to support the production of electricity from renewable sources and for buildings’ energy improvements and energy savings.

Particularly, economic tools working to promote buildings’ energy efficiency are as follows:

- **Certificati Verdi (“Green Certificates”)**: securities issued by GSE (Agency for Energy Services) at a rate proportional to the energy produced with a system powered by renewable sources and operating by 31 December 2012. Each Green Certificate certifies conventionally the production of 1 MWh of renewable energy and can be traded or sold by producers to subjects obliged to produce an amount of electricity from renewable sources in a specific market, thus getting an economic return;
- **Tariffa Onnicomprensiva (“All-Inclusive Rate”)**: it is the incentive mechanism alternative to the Green Certificates, reserved to qualified systems IAFR (powered by renewable sources), with an average annual capacity not exceeding 1 MW or 0.2 MW for wind-power installations. It 'a support system based on the delivery of a fixed rate, which includes both the incentive and the compensation for electricity fed into the grid, the value of which depends on the type of source used;
- **Conto Energia (“Energy Sum”)**: it is a support system that ensures a constant compensation of the electricity produced from solar photovoltaic systems connected to the grid and solar thermal, for a fixed period (20 years for photovoltaic installations, 25 years for the thermodynamic solar ones) through a rate for all the energy produced by the systems. This incentive system was introduced in Italy in 2005, with the Ministerial Decree dating 28<sup>th</sup> July 2005 (First Energy Sum) and it is currently regulated by the Ministerial Decree of 5<sup>th</sup> July 2012 (Fifth Energy Sum).

The rate is in addition to the sale's income or value, through on site exchange or self-consumption and the energy produced varies depending on the size and degree of the system’s architectural integration. The scheme rewards renewable productions done independently from the electricity produced;



- **Ministerial Decree of 6<sup>th</sup> July 2012:** The Ministerial Decree dated 6<sup>th</sup> July 2012 establishes new ways to encourage the production of electricity from system fed by renewable energy sources other than solar PV, with a power not exceeding 1 kW.  
The Decree states that incentives are recognized on the production of net electricity supplied to the grid by the system. Therefore, self-consumed electricity has no access to incentives. Access to incentives established by Ministerial Decree 6 July 2012 is alternative to the on-site exchange mechanisms in place and to dedicated withdrawal;
- **Titoli di Efficienza Energetica o Certificati Bianchi (“Energy Efficiency Certificates” or “White Certificates”):** negotiable securities that certify the achievement of energy savings in final use of energy through interventions and projects to increase energy efficiency. This system of white certificates was introduced into the Italian law by Ministerial Decrees on the 20<sup>th</sup> July 2004 and provides distributors of electricity and natural gas to reach annually certain quantities of primary energy savings, expressed in equivalent tonnes of oil saved (TEP).  
A certificate is the same of saving a ton of equivalent oil (TEP); companies distributing electricity and gas can carry out its obligation implementing energy efficiency projects entitling white certificates or acquiring TEE by others on the market of Securities Energy Efficiency organized by GME;
- **Conto Termico (“Thermal Sum”):** The publication of the Ministerial Decree on 28<sup>th</sup> December 2012 called "Thermal Sum", gave effect to a support system for the promotion of small-scale interventions to increase energy efficiency and the production of thermal energy from renewable sources.  
Interventions to incentive refer both to existing buildings envelope’s efficiency (insulation of walls and roofs, replacement of windows and solar screens installation) and the replacement of existing systems for winter heating systems with higher efficiency (condensing boilers) and replacement or, in some cases, new installation of power systems using renewable sources (heat pumps, boilers, biomass stoves and fireplaces, solar thermal systems also combined with solar cooling technology).  
The new decree introduces also specific incentives for energy diagnosis and energy certification if combined to the intervention above mentioned and in certain conditions. The incentive is a contribution to the expenses carried out and it is paid with annual rates for a variable duration (between 2 and 5 years) as a function of the interventions realized.  
The real news of this tool is the chance for Public Administrations to direct access to intervention on their properties. In fact, the Decree funds a yearly expense to a total amount of 200 million euro for interventions realized by Public Administration and of 700 million euro for interventions realized by private users;
- **Tax deductions for energy improvements:** costs incurred from June 6<sup>th</sup> 2013 (date of entry into force of legislative Decree 63/2013) to the 31<sup>st</sup> December 2013 for energy renewal of existing buildings are entitled to a tax deduction of 65% during the individual income tax return. From the 1<sup>st</sup> January 2014, the deduction will be 36%, which is what normally provided for building restorations. Reduction concerns, for instance, the expenses carried out for:

- energy development on existing buildings which obtain a limit value of annual primary energy demand for winter heating by at least 20% lower than the established limit values;
  - interventions on existing buildings, premises or existing residential units, regarding opaque vertical structures, horizontal opaque structures (roof and floor) and windows including frames. The condition to advantage the benefit is to meet the requirements of thermal transmittance U, expressed in W/m<sup>2</sup>K, set as limit;
  - the installation of solar panels for hot water production;
  - replacement of winter heating systems with condensing boilers systems and the simultaneous development of the distribution system.
- **Tax deductions for building's renovations:** Who incurs expenses for building's renovations can deduct personal income tax of 36%. For expenditures incurred from 26<sup>th</sup> June 2012 to 31<sup>st</sup> December 2013 (Legislative Decree 63/2013), the income tax deduction rises to 50%. In particular, tax deduction concerns expenditures incurred to perform extraordinary maintenance, restoration and preservation works and building renovations for individual apartments and blocks.

Current incentive systems proved to be able to sustain a steady growth in the industry, ensuring, in spite of frequent changes in the regulatory framework, sufficient predictability in terms of investments return and facilitating the eligibility of works. The manufacturers of technological solutions for the construction industry (insulation materials, heat recovery systems, etc.) are closely following these incentive instruments, they bring knowledge to final customers and offer them advice for the completion of the necessary papers.

The incentives described represent a consolidated national energy system, to address with necessary adaptations, for the next period, as an element of continuity important to achieve the Community new objectives.

For example, the instrument of tax deductions, introduced by the National Finance Act 2007, proved to be particularly effective for some applications. After about five years of implementation, it is currently on going the evaluation of results in terms of macro-economic effects, as well as the actual burden for the state, in order to verify the possible continuity and reshaping in ever more effective forms.

### S u c c e s s M o d e l

Passive house solutions adopted in new buildings and in renovations can present lower costs in term of global cost over considered life span, while generally the initial investments to reach the selected targets can be higher respect bad levels of performances. The current economic context lead to the need of policy measures to stimulate the **financial support of the initial investments**. This kind of support could be provided by both private (e.g. via preferential loans from private sources) both public actors.

In the initial investments supports, private measures (as preferential loans also partly supported by public contributions) and policy foreseeing public expenditures could be put in place in integrated way to strengthen each other. This could give comprehensive supports to initial investments.

Different rewards for those who decide to build a low-energy consumption building even before the obligation in 2018, for new and 2020's public buildings, for all the other NZEB

like, for instance, the chance to take advantage of a bigger part of tax deduction for some expenditure.

Financial supports could award the different levels of performances with **different level of supports** (as tax deductions, economic incentives, preferential loans, etc. ...). In this kind of approach, Passive House level could corresponds to the higher level of benefits and financial supports. Or directly from now some financial support mechanisms could focus on Passive House requirements and limits in order to make adopt them directly from today avoiding lock-in effect.

Compliance and quality controls put in place by public or private players and related need of **investments in quality controls**. So high quality interventions and good performance targets for renovations and new building can be reached, and financial support can be used only for intervention, which reach targets and limits in actual way.

The construction **market is more active** and it presents more opportunities when it offers new and renovated buildings with high energy and comfort performances, particularly if they are proved by recognized procedures, labels and standard, as the Passive House ones. Indeed due to the economic crisis and a large amount of previously built projects already available in the market, we can see that the demand for new and renovated building projects is often low in Italy. High quality buildings with high level certification labels often makes exception and they cover an interesting market segment, where customer demand and prices remain interesting. So the adoption of valuable and relevant standards as the Passive House one can represent a good opportunities in construction and real-estate sectors.

Many experts also recognized that improve the quality and performances offered in the project in the building sectors is crucial for a new development of the construction market.

This represent a great opportunity also for designers, consultants, experts and qualify craftsmen in order to be protagonist in the next year from now for their valuable knowledge in the field of passive houses.

**Public tenders requesting passive house projects** could be useful to increase the capacities and the opportunities for this market. And on the other and this could provide local administration with high quality buildings with a lower (and also much lower) operation costs for energy bills, leading to an overall savings for the public local administration.

Many examples of public buildings built according the Passive House standard are described as beacon projects in PassREg ([http://passreg.eu/index.php?page\\_id=70](http://passreg.eu/index.php?page_id=70)). For examples we can see kindergartens, day-care centres, schools, social housings, cultural centres.

## Forms of funding

### Baseline

The main funds addressed to buildings' energy efficiency are those of third-party financing and energy performance contracts signed with the Energy Service Company (ESCO).

The energy performance contract (Energy Performance Contract, or EPC), regulated in Italy by Legislative Decree no. 115/2008, is a contract by which one "supplier" party (ESCO) is

obliged to the completion - with its funds or with third parties financial resources – of a set of integrated interventions aimed at developing and improving the efficiency of an energy system (system or building) owned by another person (the beneficiary) who receives a reduction of energy consumption of those buildings object of the intervention.

In this case, then, it is the ESCo to anticipate the costs of investments needed; otherwise, it assumes the obligation to find the financial resources from a third parties (usually, banks), at no cost to the interventions' beneficiary, and it is remunerated on the basis of actual results acquires by the client through the implementation and modernization of technology, systems and structures.

Therefore, EPC is normally carried out using the mechanism of the Third Party Financing (TPF), through the provision by a third of the economic resources needed to develop the project.

The benefits of third-party financing are remarkable for those who decide to take action: you get an immediate reduction in energy expenditure without making any financial investment, you can use economic resources to other projects; maintaining investment opportunities without changing the financial situation, getting a replacement of machinery with more performance, obtaining its ownership by the end of the contract.

Finally, it is important to stress that many banks and lenders offer loans at subsidized rates for the installation of systems for the production of energy from renewable sources and buildings' energy redevelopment.

It should also be noted that in some cases Regions may enter into agreements with local banks to provide loans at zero interest rate.

Often, the funding in its various shapes, is the only chance for citizens and businesses to invest in measures to improve energy performance, so it will be increasingly necessary to strengthen the dissemination of specialized tools for these interventions, such as ESCOs and financing both at national and local level (through, for example, the collaboration between the City and individual private companies). In addition, new financial and specialized instruments for the promotion of nearly zero energy buildings should be provided.

### Success Model

In general as we said, passive house solutions adopted in new buildings and in renovations can present lower costs in term of global cost over considered life span, while generally the initial investments to reach the selected targets can be higher respect bad levels of performances. The current economic context lead to the need of policy measures to stimulate the **financial support of the initial investments**. In general this kind of support could be provided by both private (e.g. via preferential loans from private sources) both public actors.

So far, financial incentives in place in Italy mainly support refurbishment projects.

**Limits to benefits of financial incentives** are increasing and they shows and interesting developments and values during the last years. However it could be important focusing also on limits and requirements typical of Passive Houses projects. These requirements can be improved in the actual support mechanisms respectively according the following ways:

- **directly improving** the actual limits reaching the limits more suitable for nZEBs and Passive Houses;
- or improving **with intermediate steps** and values to be put in place in these next few years, reaching soon the limits more suitable for nZEBs and Passive Houses;

- or **establishing different entity of financial support** with greater benefits and supports for those who adopt requirements and limits suitable for nZEBs and Passive Houses;
- if this third strategy is adopted, it's important that the differences in the supports entities are adequate to justify the choice to adopt the best requirements.

The main financial support mechanism now in place (tax deductions and economic incentives) concern renovation projects. For this the **Enerphit requirements**<sup>2</sup>, related to the Passive House standard and optimized for existing buildings, could be adopted in easy and effective way.

We have to signal that the mechanism actually in place to support low energy renovations and installations of RES systems could be extended also to valuable projects for new buildings.

Particularly new buildings built with better features and performances respect the mandatory regulation level could receive financial supports as exemplary buildings - beacon projects.

It could be interesting to introduce funding mechanism **also for new buildings** which represents shining and actual examples of nZEBs and Passive Houses.

This could help the development of nZEBs in our regions.

This considerations here above are valid both for national forms of funding both for local (regional, municipal, etc.) ones.

The following financial incentives can be adopted to support passive house solutions and projects. In general this mechanism can be adopted both at national both at regional and local levels.

- Tax deductions,
- economic incentives for the investments,
- preferential loans (with null or very low interest rate)

All these mechanisms are already in place or tested in Italy.

At municipal level, the adoption of Passive House measures and standard could be supported by the **reduction of taxes and costs (oneri di costruzione)** which have to be paid by the builder / developer to the municipality.

Forms of funding should be adopted also for the support of **energy and comfort monitoring** campaigns. A financial support, using the previously described mechanisms, could cover part of the costs of the monitoring equipment, which could meet the requirements of guidelines and regulation adequately developed for this.

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<sup>2</sup> Further details on EnerPHit, certified retrofits with Passive House components, are presented here [http://www.passiv.de/en/03\\_certification/02\\_certification\\_buildings/04\\_enerphit/04\\_enerphit.htm](http://www.passiv.de/en/03_certification/02_certification_buildings/04_enerphit/04_enerphit.htm)

## 3

### KEY ACTORS

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This section introduces stakeholders (individuals and institutions) engaged in the development and implementation of policies to promote “nearly zero-energy” / “passive” buildings.

#### Departments of regional and local administrations

We can consider the following departments and areas in the **regional / provincial administrations**.

These actors are relevant for the development of strategic planning, regional regulations, technical guidelines and guidelines for local regulations. They can define performances levels, technical features and limits, calculation methods.

The regional departments are also important to define public tenders for renovations of existing buildings, new buildings projects and management of existing buildings.

Often buildings managed by the regional administration can be large buildings as hospitals, public offices, large residential buildings, schools, etc.

For the process of development of nZEBs / Passive Houses we can consider the following departments and areas in the regional administrations:

- energy and environment (*energia e ambiente*)
- urban planning (*urbanistica*)
- building and construction (*edilizia*)
- public constructions (*opera pubbliche*)
- school (*scuola*)
- health (*sanità*)

At municipal level, the following departments / units / divisions are also relevant to determine local building regulations and codes, which directly determine the features of the project at local level. They are also important for the management of the municipal buildings (offices, schools, residential buildings, sport buildings, etc.). They also develop public tenders for project related to the municipality

- energy and environment (*energia e ambiente*)
- urban planning (*urbanistica*)
- building and construction (*edilizia*)
- public constructions (*opera pubbliche*)
- school (*scuola*)
- health (*sanità*)

In the process the local **energy managers** in charge are also very important.

A key role could also be played by the **local energy utilities** we can put in place decisions and investments to support nZEBs and Passive House projects, or they could act as ESCOs for this.

Other local administrations represents real and blighting examples from Europe as Front Runner Regions for the actual development of passive houses on large scale. It's the case of the regional administration of Brussels and the municipality of Hannover. This demonstrate that the change is possible starting from the local level, with direct successful impacts on local environment and economy.

For the experts and technicians of the regional, provincial and municipal departments / units, there is an opportunity of training and capacity buildings about

- the Passive House concepts and basic principles
- and as further step on the requirements, limits, design methodology and details of the Passive House Standard.

It's important that local administrations communicate and **disseminate progresses and features of the local beacon projects** (shining examples) of nZEBs and Passive Houses already built or under development at local level or nearby.

Local dissemination / training events should be organized for the citizens and different stakeholders, starting from the event organized in the framework of the PassREg project.

The complete set of requirements and limits of the Passive House standard help in the **quality assurance** of the project. However more controls for the quality of the project can help the development of actual nZEBs. Personnel of local administration should have knowledge and competence to control the quality of the building projects, both for public and private ones, in order to check the compliance with the energy certification label.

Personnel of regional and local administrations should develop **guidelines for monitoring of energy and comfort performance of the buildings**. If necessary, these guidelines can be developed also with the support of local universities, research centres or consultants.

Then personal of the local administration should collect, manage and analyses the data from the monitoring of selected exemplary buildings. Their real performances in terms of energy consumption, on-site energy production from RES and indoor comfort performances should be checked and compared with the requirements of Passive House standard, other relevant benchmarks and the fixed targets.

Regional and local administration should have the competences to **develop and manage public tenders** requesting for Passive House project. It could be useful that they can also design and perform quality check according the Passive House standard.

**Energy managers** in charge in the local administrations should deepen their knowledge on the Passive House principles in order to guide the maintenance and renovations of existing buildings, systems and components.

### Other stakeholders

Other stakeholders who have to be involved in the process are

- local and national associations of engineers, architects, experts, designers, etc.,
- local and national associations of builders and craftsmen,
- local and national umbrella associations of companies in sectors of construction and building components,
- local and national associations for environment and climate protection and sustainable actions,
- associations of citizens and consumers,
- committees of citizens for environmental protection and sustainable urban planning,
- students and teachers of local schools (basic general schools),
- students and teachers of local schools linked to the building / construction sector,
- universities, research group and research centres, which are active at local level, but also at national and international ones.

The knowledge on Passive House principles and standard have to be spread and deepen trough the networks of the identified stakeholders. This can ensure valuable references in the field of nZEBs and it push for the development of passive house projects in the regions.

The shining examples of the beacon projects collected and analysed in the PassREg project represent great opportunities and references to be shown as examples. Also information exchange between the aspiring regions in Italy and the successful front runner regions in Europe is very valuable.

Dissemination and training events in PassREg are developing this process. An further future events will be useful and effective.

The knowledge of benefits and quality of the Passive House principles toward nZEBs should be increase at the demand-side for citizens and costumers. So they can ask for better quality and energy efficiency services and products and projects in the market

On the other hand designers, consultants and builders have to be train in order to increase their technical knowledge about the Passive House principles and requirements. It's useful to start this process also in the school training future experts in the building sectors.

Cooperation between universities, research centres, companies and local administrations should be developed in order to exchange competences and knowledge. This could also enforce the relationship with other association and regions also at european level. This possible cooperation could help also to find forms of funding and to develop suitable research and demonstration projects.



It could be useful that companies in the field of constructions and components for buildings and systems are involved in the process. We can see examples of this in some PassREg beacon project in Italy as in Mascalucia and in Lonato del Garda, where the design teams have developed a network of local and national companies producing building components suitable for zero energy buildings. They want to give high visibility to the building and they already presented it during local technical training sessions for designers and consultants. Technical visits in the construction side was already done, open to visitors who wanted.

## 4

# CAPACITY FOR PLANNING, DESIGN AND CONSTRUCTION

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This section is dedicated to preparedness (knowledge and skills) of specialists on planning, design and construction for the introduction of “nearly zero-energy buildings”. It includes experts from the municipal administration, planners, developers and other interested community groups involved in the various stages of the process of creating “nearly zero-energy buildings”.

### Training of local administrations

Also in the field of low energy buildings and environmental issues, the training of personnel of the local administrations is a great opportunity. We can recognize a high potential in the capacities of technicians, experts and personnel of the local administrations, if they are well trained and their knowledge is updated. This could bring to an advantageous improvement of the quality in the private and public building sectors, thanks to higher quality in controls and regulations. In addition more projects than now could be developed inside the public authorities offices with in-house resources.

This could produce also **energy and costs savings** thanks to energy efficient buildings, adoption of RES systems and use of in-house resources for the development and design.

The training opportunities for the public authorities personnel can be

- Training course in the field of Passive Houses and nZEBs organized by *eERG - end-use Efficiency Research Group of Politecnico di Milano* ([www.eerg.it](http://www.eerg.it)) in the framework of PassREg project;
- Training courses for passive house designers organized in the framework of the *Passive House Institute* ([www.passiv.de](http://www.passiv.de)) and the associated organization *Zephir* in Italy ([www.zephir.ph](http://www.zephir.ph));
- Training courses for passive house trades persons organized in the framework of the *Passive House Institute* and the associated organization *Zephir* in Italy;
- Training courses for passive house trainers organized in the framework of the *Passive House Institute*;
- European and national study-tours, visits and information exchanges in more advanced regions as organized in the framework of the PassREg project.

## Training of designers and builders

The training opportunities for designers and builders can be

- Training course in the field of Passive Houses and nZEBs organized by *eERG - end-use Efficiency Research Group of Politecnico di Milano* ([www.eerg.it](http://www.eerg.it)) in the framework of PassREg project;
- Training courses for passive house designers organized in the framework of the *Passive House Institute* ([www.passiv.de](http://www.passiv.de)) and the associated organization *Zephir* in Italy ([www.zephir.ph](http://www.zephir.ph));
- Training courses for passive house trades persons organized in the framework of the *Passive House Institute* and the associated organization *Zephir* in Italy;
- Training courses for passive house trainers organized in the framework of the *Passive House Institute*;
- European and national study-tours, visits and information exchanges in more advanced regions as organized in the framework of the PassREg project.

It can be useful starting from basic courses on the principles of Passive Houses towards zero energy buildings. These could be also short but valuable courses and presentations aiming to give the basic knowledge of the Passive Houses requirements and benefits. Then the stakeholders could further deepen the arguments with other courses and experiences. These basic course it could be free to allow greater participation. This could have an important impact.

The quality of the official courses about Passive Houses is recognized. The courses are comprehensive, detailed and well structures. They foresee official exams for which who want to reach certification as Passive House Designers and Passive House Trades Persons.

This could be important for both designers, builders and craftsmen.

Particularly on some arguments, the training activities seem to be very useful and urgent, for example about the design and construction for the air-tightness of buildings envelopes.

These kind of courses could be held in the whole country from the north part of Italy to the South, allowing persons from all regions to take part to the courses.

Improving the real knowledge of the Passive House standard allows designers to reach more job opportunities and projects also in the other european countries, where the standard is already spread.

Visits to the beacon projects in italian regions and other countries also contribute very well to the training opportunities for designers, builders and customers.

Several visits to the beacon projects of PassREg and to other valuable Passive Houses are organizing, particularly during the International Passive House Days organized each year at the beginning of November in all Europe and the world<sup>3</sup>.

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<sup>3</sup> Further information about opportunities of visiting Passive Houses in all countries are available here:  
[http://www.passivehouse-international.org/index.php?page\\_id=262](http://www.passivehouse-international.org/index.php?page_id=262)

## 5

# SUCCESSFUL PRACTICES

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This section presents successful examples of passive buildings, already built in the region. It aims to show how the PassREg project aided and accelerated the process of their creation. It describes programmes to build passive buildings in this project and offers similar programs for future years.

Among the selected beacons during the PassREg project, we can recognize several different buildings and ownerships typologies. The beacons related to the Italian Regions show shining examples of both new and renovated buildings, private and public ones.

We present here the list of beacons in the associated aspiring regions in Italy. For further details please see the pages on Beacons on the web-site of the PassREg project - [www.passreg.eu](http://www.passreg.eu).

### smart Zero Energy Building - Botticelli project (Sicily)

Zero-energy, certified Passive House new build with strategic shading and cooling strategies as well as PV and potentially other RES. The building is designed as zero-energy building and it's certified according to Passivhaus standard, respecting requirements in terms of thermal performance and air tightness. The reduction of energy need is accompanied by the local production of renewable energy by means of photovoltaic modules, a thermal solar system and a earth to air heat exchanger (EAHE) in the mechanical ventilation system. In particular, the EAHE provides pre-heating or pre-cooling to the air supplied by the ventilation system. The supply-air temperature can be further adjusted by means of a heat recovery unit and a heating / cooling coil before entering the indoor environment. A solar thermal system is integrated with a heat pump generator. The system is automatically regulated by a building automation system supported by KNX protocol. The dwelling also benefits from natural ventilation (cross ventilation) – especially for night cooling - enhanced by an internal patio and the optimal layout of window openings. The building will be fully monitored for energy and comfort for at least 2 years by eERG research group, [www.eerg.it](http://www.eerg.it). The PassREg project will serve to disseminate the findings on a large scale. Large multiplier potential for Passive House + RES as the building has already gained the interest of industry and local governments. --> Design team: Eng. Carmelo Sapienza ([www.sapienzaepartners.it](http://www.sapienzaepartners.it)) - eERG - end-use Efficiency Research Group of POLITECNICO DI MILANO ([www.eerg.it](http://www.eerg.it))

### Leaf House (Marche)

The building is an apartments block with 6 dwellings. It represents one of the very first examples of nZEB in Italy, with high thermal insulation of envelope, solar thermal and photovoltaic systems, ground heat exchangers and heat pump. All the main suitable solutions for nZEBs are well adopted and integrated in this building. It's already monitored for energy and comfort performances. --> Project team: Loccioni Group ([www.loccioni.com](http://www.loccioni.com))

## Villa del Sole (Lonato del Garda)

Passive house, zero energy residential building, analyzed in design phase by PHPP calculation tool. Solar thermal and photovoltaic systems are well integrated in the south oriented roof surfaces to reach nearly zero energy targets. In addition to all the main technical solutions commonly suggested in Passivhaus Standard, also heat recovery systems on hot water discharges are adopted. An interesting component is also well integrated solar shading elements consisting in a pergola with climbing deciduous vine guarantying the needed shading in summer and the solar gain in winter. The building envelope and structure are characterized by wood materials (certified osb panels and timber elements, wood wool thermal insulation panels) with high environmental sustainability value. The adopted construction system uses prebuilt building elements, leading to a very precise, high quality and fast construction of the building. The building is visited also by many people as building designers, construction craftsmen, students, policy makers and other interested common people. It has become a real beacon project for this area. -----> Design team: P.I. Vincenzi R. (progettoenergia.net - casazeb.it) - Arch. Cabini G. (www.cabini.it) - Dott. Paganin D. (www.lehner.villebio.it)

## Casa Light - social housing (Lonato del Garda)

The purpose was to build social housing zero energy buildings with low cost of construction, maintenance, low energy bills and high thermal comfort during all the year.

This is the first multy family passive house building in Italy. Also is the first social hosing passive house in Northern Italy. It was built with low economical effort and is very likely to be reproduced in all the Country. This building demonstrates that is possible to built passive houses with not much extra-cost. Renewable energy systems are integrated on the roof with solar photovoltaic panels grid-connected which partially cover the electrical energy demand of the heat pumps installed. Interesting balconies structure and integrated movable external solar shading were installed. Decentralized mechanical ventilation systems with heat recovery is installed with a ventilation machine for each apartment while the distribution system to bring in fresh air from outdoor and out the exhaust air is put in place in the common spaces of the stairs. --> Project team: Angiolino Imperadori – Giovanni Ziletti – Sergio Rossi – Alessandro Ziletti.

## Passive house Cantù (Cantù)

Passive house, nearly zero energy residential building. Solar photovoltaic systems are integrated in the roof. Air to hearth heat exchanger integrated in mechanical ventilation system. High thermal insulation of envelope was reached with thermal transmittance values of 0,127 W/(m2K) for external walls, 0,146 W/(m2K) for the basement, 0,138 W/(m2K) for the roof, 0,70 W/(m2K) for the glazed surfaces and 0,80 for the frames. External automatic solar blinds are installed for solar shading when it needs. A mechanical ventilation system with heat recovery is completed by a an horizontal earth to air heat exchanger (about 150 m long at depth of 1,2 m below the ground). A reversible high efficiency heat pump is installed. A photovoltaic systems is installed on the roof. --> Project team: Architetti Associati Cappelletti & Cerliani (Mariano C.se)

## Palazzo Positivo - Refurbishment of a multi-family building (Chiasso)

This successful refurbishment of existing multi-family building reached the target of “plus” energy building basing on the Passive House Standard certification. The building, composed of 19 apartments, represented a typical examples of apartment block built in 1965. In the deep renovation adopted, the Passivhaus principles were integrated with renewable energy systems as solar thermal panels on the roof and photovoltaic panels well integrated on vertical surfaces of the facades and the south exposed balconies and on the roof. The integration of this RES components leads to an attractive architectural aspect. Thanks to passive house + RES solutions the renovated building will produce more energy than it consumes. --> Project team: Gasser Gebaude AG - Chur ([www.gasser.ch](http://www.gasser.ch))

## Scuola Raldon - public school (Municipality of San Giovanni Lupatoto)

he project is an interesting school building passive house certified. The Municipality of San Giovanni Lupatoto (Verona) ordered and holds the building. High thermal insulation level of the building envelope is completed by external movable solar blinds and a decentralized mechanical ventilation system with heat recover well integrated in windows and façade components. This offers high aesthetic quality and high potential in control of indoor air quality and energy saving related to the ventilation. A building management system allows for comprehensive automatic control of ventilation system, solar shading devices and other functions. --> Project team: Michael Tribus Architecture ([www.michaeltribus.com](http://www.michaeltribus.com))

## Mediterranean passive house project in Portobello di Gallura (Aglientu)

The project is a private house, located in the residential Park of Portobello di Gallura, Comune di Aglientu (OT) 41°07'20" N 09°01'45" E, in the north west of Sardinia at about 50 meters linear distance from the seaside. The plot of land is on a slope and, quite typical for Sardinia, composed of granite rock with low Mediterranean vegetation (Mediterranean spot). Due to the strong wind and the narrow shape of the land on a slope, the three levels of the house develops on three different angles each, in order to follow the course of the landscape. This articulated volume also creates two different external areas, each one protected from different winds. The “wings” of the building are made out of locally sourced granite (or potentially plastered brick) for the wall as well as cotto tiles for the roof. The central volume, where there is an open space living room with a fireplace, has the north and south front entirely made out of glass. On the south side of it, there is a pergola intended to create shade in the summer and leave sunlight to pass in the winter. -----> Project team: Arch. Patrizia Attanasi and eERG - end-use Efficiency Research Group of POLITECNICO DI MILANO ([www.eerg.it](http://www.eerg.it))

## Social Housing Case Finali (in the Municipality of Cesena)

The project is a Social Housing multi-storey building set at the south-est bound of the city. It is part of a large urbanization of an undeveloped area really next to the hillside and

simultaneously close to the city's main road, the city centre, the hospital and the S.Maria del Monte abbey. Experimenting a revisited "ballatoio" social residential typology (access to the flats from a long semi-private balcony), the building hosts 25 flats served by a single staircase. Thanks to the Policy document for the promotion of sustainable building of the Municipality of Cesena ([http://passregos.passiv.de/index.php/Policy\\_document\\_for\\_the\\_promotion\\_of\\_sustainable\\_building](http://passregos.passiv.de/index.php/Policy_document_for_the_promotion_of_sustainable_building)), the beacon project presented within the PassREg project has benefited from reduced urbanization costs, lowering the final building cost.

(<http://www.archefice.it/portfolio-item/social-housing/#toggle-id-3>)

### Multi-family residence (in the Municipality of Cesena)

The project foresees the demolition of an old building with a high level of energy consumption and the realization of a new Passive House building: a dry technology multi-residence, made with structural wood panels. This technology reach less walls thicknesses as well as important energetic performances and a construction time reduction of 60% compared to traditional wet technologies. In this case, the dry technology chosen was forced by project needs and scopes, over all considering some normative prescriptions as shape's respect and boundaries limitations: each increase of walls dimensions would have produced a decrease of useful surfaces. In addition to that, timing reductions produce important benefits, overall in economic terms: less bank's debt and a faster income for clients. The functional building envelope has, at last, a thickness of 40 cm and its stratigraphy could develop important energetic performances, both in term of transmittance ( $U=0.136 \text{ W/m}^2\text{k}$ ) and of thermal lag ( $\lambda=16$  hours). These performances in a traditional building (made with concrete and slabs) require thicknesses exceeded 30%. In continuity with energetic performances, the project devise the use of triple-glazed windows ( $UG=0,6\text{W/m}^2\text{k}$ ) as well as the integral and continuing insulation into all building overhangs, in proximity to junctions between opaque and transparent envelope, and in adherence with padding, sills and docks.

(<http://ec2.it/stefanopiraccini/projects/252655-multiresidenza-passiva>)



## 6

# RENEWABLE ENERGY SOURCES

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Passive House principles can be the base for an **optimal integration** of renewables energy sources systems in buildings. Passive Houses have **very low energy demand** which can be cover completely and in easier way with the on-site integration of RES systems.

So dimensions and components of RES systems can be optimized with an easier integration to reach the **nZEB targets**.

Passive House strategies allow to adopt the way indicated by the EPBD recast, which asks for “*energy efficiency first*” and then to cover the remain small energy demand of the buildings thank to on-site RES.

This allows also RES systems which are easier to manage and with better relationships with grids. Thanks to lower energy needs for all uses, the match between the RES energy production and the energy demand can be manage in easier and better way.

In Italy the requirements for RES systems to produce electricity and thermal energy in buildings are expressed by the **Legislative Decree n. 28 of 3<sup>rd</sup> March 2011** (also called *Decree Romani*). This national regulation requires a certain amount of electricity produce by photovoltaic and percentages of thermal energy demand cover by RES systems both for new and renovated buildings. The Decree is quite interesting and require the installation of an amount of RES systems quite ambitious, which increases following steps in the next years.

Often local authorities, designers and experts recognized that the limits requested by the Decree are quite high and difficult to be reached in practice if we consider common buildings.

Adopting the Passive House approach and performances allows to reach in easier way the RES percentages of coverage requested by the Decree, making it really feasible and improving the projects compliance with it.

Different policy mechanisms are and have been in place in these years to support the development of the RES systems in Italy, as we described in the previous chapters.

## 7

## PUBLICITY AND PUBLIC SUPPORT

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This section should demonstrate the commitment of local authorities to follow a consistent communication policy and their willingness to implement “nearly zero-energy” (“passive”) building standard in the design and construction practice through active public support and participation of all interested groups of local society. The outlined framework to develop a local communication strategy in relation to the “passive house” concept can be used in future community programmes and strategic documents dedicated to sustainable energy development.

### Communication Strategy

Develop a communication strategy for the municipality in low-energy buildings as part of sustainable urban development. Follow the steps in these directions, but do not forget that in the end you will again return to the first step:

i. **Ensuring sustainable management:** Define the scope and duration of the communication strategy. Ensure sufficient time and financial resources to collect and process the information needed to carry out planned activities and to monitor the implementation of the strategy. Consider the need to attract external consultants or to undertake additional training for local experts. Ensure consistency of the message and link it to the municipal communication strategy (if available). Develop a plan and set resources for risk management and conflicts.

ii. **Defining goals and objectives:** Define clear and specific goals - what will be achieved through the implementation of the communication strategy? Put tasks according to defined objectives with expected results that can be quantified.

iii. **Selection of target groups:** Identify key target groups according to specific criteria based on the goals (e.g. "designers with experience in the design of buildings of Class" A"). Do not use general descriptions (e.g. "the general audience"). Do not limit yourself with groups that can contribute directly in achieving the objectives, and include those who will become the users (direct or indirect) of the results. Do not forget internal audiences: municipal counsellors who have connection with the problem area concerned, experts in administration, municipal officials and others.

iv. **Select the appropriate message:** Consider the different motivating factors attracting each of defined target groups. On this basis, develop a unifying message that can serve as a rallying point for all communication activities in the future. Every public event should work in support of the crafted message. Since this is one of the most difficult elements of the communication strategy, do not be discouraged if you encounter difficulties in the beginning. Describe in detail what you can offer to your target audiences and develop specific messages for each of them. Organize focus groups and brainstorming sessions in the team. If necessary, try to find support by a professional consultant.

v. **Choice of media and communication tools:** Determine the most appropriate communication channels for each target group and, if necessary, consult with

representatives of the groups. Prepare appropriate materials for each of these channels. Create a database of media contacts and organizations whose support you will need. Pay particular attention to local media. Try to "tell stories" with their own storyline, climax and moral, rather than recite facts. Create news that directly affect the daily lives and work of members of the target groups.

vi. **Monitoring and evaluation:** According to the tasks and the benchmarks for their achievement, develop a monitoring and evaluation scheme with periodic reports. Ensure sufficient time resource for data collection and analysis of the feedback generated by communication activities. If necessary, adjust the communication strategy according to target groups' reactions.

## Communication Plan

Start by developing an **annual plan** of the envisaged communication activities:

(i) Plan **4 to 6 major events** - organized by you or conducted by external organizations, each of which have specific objectives and expected results. These events, although individually targeted to specific groups, by the end of the planning period should be extended to all defined target audiences.

(ii) Organize communication activities about the events, trying **to plan specific results of any of them** that build on previous achievements. Plan preparatory activities before each event, e.g. dissemination of information materials, articles and reports in the local media, publications, social media, forums, etc., designed especially for the event audience in order to create a basis for informed discussion.

(iii) Provide sufficient resources to **disseminate the results** after each event and to account for the reaction of the participants. Use and seek active participation in events, which directly affect the target groups (often organized by their branch associations), but do not spend too many resources in specific activities that are not directly related to the tasks at the specific stage of the plan. Do not commit to specific business interests.

(iv) Seek **synergies with other projects** in the municipality. Look for opportunities to reach out to groups that are often overlooked (e.g. children, students, women, the unemployed, etc.), but in certain situations can affect the decision making process.

(v) Determine periods for **monitoring and analyzing** the performance of the communication plan, defining responsible officers and allocating available resources. In the event of unexpected situations and the availability of new information, changes in the plan are required.

(vi) The development of a **communication plan for the next year** should begin at least two months before the end of current one.

**Do not limit yourself to publish information on the website of the municipality only!**