AFFIRMATIVE INTEGRATED ENERGY DESIGN ACTION

AIDA

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D3.2: Public buildings tenders for the several case studies with the nearly zero energy target

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Contents

List of acronyms

NZEB	Net Zero Energy Building
nZEB	nearly Zero Energy Building
IED	Integrated Energy Design
IEQ	Indoor Environmental Quality
IEA	International Energy Agency
SHC	Solar Heating and Cooling
ECBCS	Energy Conservation in Buildings and Community Systems
EPC	Energy Performance Certification
DHW	Domestic Hot Water
RES	Renewable energy source

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1. Introduction

AIDA offers support to public authorities to increase the number of nZEBs by including this energy target in public design tenders for new buildings (or buildings to be renovated / refurbished) and push design teams to follow an Integrated Energy Design (IED) process.

This deliverable reports on the collaboration performed by AIDA's partners with some municipalities and design teams involved in the project, in particular for the:

- definition of nZEB target;
- management of an IED process;
- introduction of the energy performance requirements in public design tenders, use of an IED process and assessment of the energy performance results during the evaluation phase.

In some case studies, due to economic difficulties of the respective public administrations, it was not possible to implement and issue the public tenders, and the offered support was concluded after issuing feasibility/preliminary studies. These studies allowed defining the best energy efficiency measures to achieve the nZEB target, as well as minimum energy performance requirements to use in future building design tenders.

2. nZEB target in design process

The lack of knowledge of the nZEB theoretical framework is often limiting for those municipalities that want to achieve nZEB targets. Although their internal energy experts may qualitatively know about the concept as introduced by the EU directive 2010/31 and its relative national transposition, they have no experience in using or managing methods for the energy balance calculation, nor the skills and expertise to check the results. Therefore, one of the aims of the AIDA action in WP3, was to support its practical implementation in public procurement processes for building design or construction of the nZEB concept, on the basis of knowledge and background of the AIDA partners. In order to introduce the nZEB target and the IED approach, first of all, the AIDA partners organized a series of meetings, for municipalities and design teams involved in the building projects, to present different topics, discuss and fix energy targets, and explain the Integrated Energy Design procedures, whose implementation process was subsequently supervised and supported.

It is normal practice in the planning process of public buildings, at the beginning of the procedure, the local authority to undertake a feasibility study of the possible configuration of the building that is to be designed and built (scope, schedule and budget). This study is necessary for scheduling the works and to fix the investment costs, and required public funding.

When the budget has been decided, the public administration starts to plan the tender for the design competition or for the public service contracts.

In the AIDA project we have supported the municipalities during the following two actions: (i) elaboration of feasibility/preliminary studies and (ii) definition and management of performance-based design tenders. Both actions aimed at introducing, evaluating, and developing the nZEB target from the early phases of the planning process, through an Integrated Energy Design process.

A summary of the steps in the process of building up a collaboration between the IED organization and municipalities:

1. First contact: e-mail and telephone. Send information about the AIDA project (flyer, documents, web links, etc.) and explain in detail the collaboration opportunities (energy tender, simulations, etc.).
2. Ask for the interest in collaborating in WP3. For positive answers, request information about the project. Finally, establish a possible meeting.
3. First meeting: it is very important to integrate the different needs and projects of the municipality, as well as critical dates (deadlines) and the project process (types of procedures and contract typologies, grant or subsidy requests, etc).
4. Establish a direct contact with the municipality's technician (often an architect), if there is, to determine their knowledge level and foster their capacity to participated in the IED process (for example, their ability to do thermal and RES simulations related to energy efficiency).
5. Definition of the nZEB target: energy performance indicators (energy balance, heating/cooling/electric demand, IEQ level, etc.), energy calculation methods (tools and methods) and evaluation methods for tender competitors (ranking procedures through assignment of points and weighted sums). Energy target approved by the municipality.
6. Develop different work plans, offering different collaborations according to the partners involved according to their expertise (for example: collaborate in tender procedure, perform simulations and recommendation reports to establish nZEB objectives in future tenders).
7. Establish a work plan, adjust if necessary during the process.
8. Adapt the IED process to different scales and times of execution (timing schedules and deadlines, design phases, different actors involved such as design teams, external consultants, administrative departments in large municipalities, different types of procedures and contract typologies, etc)
9. Invite all participants from the municipality to take part in different activities organized by the AIDA consortium (for example study tours, workshops, conferences, etc.)
10. Give the municipal team (technician, mayor, etc) the draft version of the energy report elaborated within the IED process so as to adjust the final tender documents (recommendation report/specifications, etc).

Elaboration of feasibility/preliminary design

11. Definition with the municipality of the next steps.
12. Definition of the design tender and typology of procedures (Directive 2004/24/UE)
13. Definition of guidelines to support the design teams during the development of the energy strategy
14. Definition of the necessary points to introduce in public tenders:
    - objective: nZEB target
    - architectural / functional / economic / energy / legislative requirements
    - minimum energy performance indexes
    - method for energy balance calculation
    - simulation tool

- IED process rules
- participants requirements
- award scoring criteria (nZEB criteria, energy expert)
- jury composition

15. Support the jury with the energy evaluation

Public design tender

16. Continue with the collaboration in different phases: support the project design team in the next phases.

2.1 Feasibility/preliminary studies

The reduced investment in the public building market, due to the economic crisis, has meant cancelled projects for pubic tenders for new buildings or renovated ones. Municipalities involved in this action have consequently suspended the tendering process. In some cases, the goal of the collaboration was changed into a feasibility studies potentially leading towards municipal tenders, developed through an Integrated Energy Design process.

These collaborations aim to support the municipalities in using an innovate approach (IED) able to resolve a large number of problems during the design phase, thereby achieving a high quality level in terms of energy performance. Thanks to the AIDA partners knowledge, the nZEB concept is been introduced from the early phase of the public planning process. In this way the final goals are fixed from the beginning and known to all work teams. In this phase it is necessary to organize meetings to introduce the nZEB concept and stimulate the public partner to adopt nZEB target. The meetings are necessary for discussing different topics with different experts (architect, mechanic and static engineers, energy expert…), public representatives (elected officials and municipality Service directors or technicians), and building occupiers. When the working group is convinced to follow the same goals, it is easy to divide and share the work (who does what and when), share the materials, and maintain positivity in the working group.

The support supplied through AIDA helps to define energy measures able to increase the energy efficiency of the building case studies and to calculate the energy balance. The aim of the feasibilities studies was to determinate the minimum energy performance values of the building components (envelope and thermal-electric plants) essential to achieve the nZEB target. Using energy simulation tools (static and dynamic) the energy performance of the building is calculated as well as the energy and money savings for different technical solutions are evaluated with regard to their potential to save energy and money. In some cases, the energy strategy defines energy performance measures limited to some building components in relation to the ‘state of the art’ of the existing building or economic restriction. A positive result is obtained when the thermal/physical parameters of the technical solutions proposed are introduced, by the public administration, in the next competition tender such as minimum energy performance indexes.

Twenty-five (25) partners were involved in this action. In some instances, more than one collaboration took place in a given municipality, resulting in a total of twenty-eight (28) collaborations. These were divided as follows:

- 3 collaborations with EURAC
- 4 collaborations with AEE INTEC
- 4 collaborations with CRES
- 6 collaborations with HESPUL
- 2 collaborations with TU Wien
- 4 collaborations with IREC
- 3 collaborations with GreenspaceLive
- 2 collaborations with Geonardo

Each feasibility/preliminary study has a justification to explain the reason why the public procurement process did not result. Most of the time, the reasons were related to the actual financial availability or timing issues (administrative public procedures are often long and slow).

2.2 nZEB target in building design tenders

The necessary requirements to allow the contacted local authorities to participate in the AIDA project action within WP3, were (i) to have the plan to realize a new building or to refurbish an existing one, (ii) the wish to pursue a nZEB target for such buildings, and (iii) the right timeframe in agreement with AIDA project one. The right timeframe means having an investment budget allocated for a clearly identified new or existing building to be refurbished, a design process at the very early stages: before the finalization of the preliminary architectural project or just after it (usually made by the internal experts without nZEB knowledge).
Within the AIDA project, we worked to support municipalities both in specific public procurement procedure, defining technical annex's to the performance-based tender, and with a longer vision, defining minimum energy performance requirements to introduce in future tenders.

Apart from the minimum energy performance requirements, to achieve the nZEB target it is necessary to introduce into the tender text: participants' requirements (references, description of design team, etc.), jury composition requirements and energy performance award scoring criteria. To ensure the same level of information and an equal treatment in the evaluation of the energy performance calculation, 'Energy guidelines' were developed and annexed to the tenders core text. They could variously include a description of the nZEB concept, the method for the energy balance calculation, the IED process and the minimum energy performance (see Figure 1).

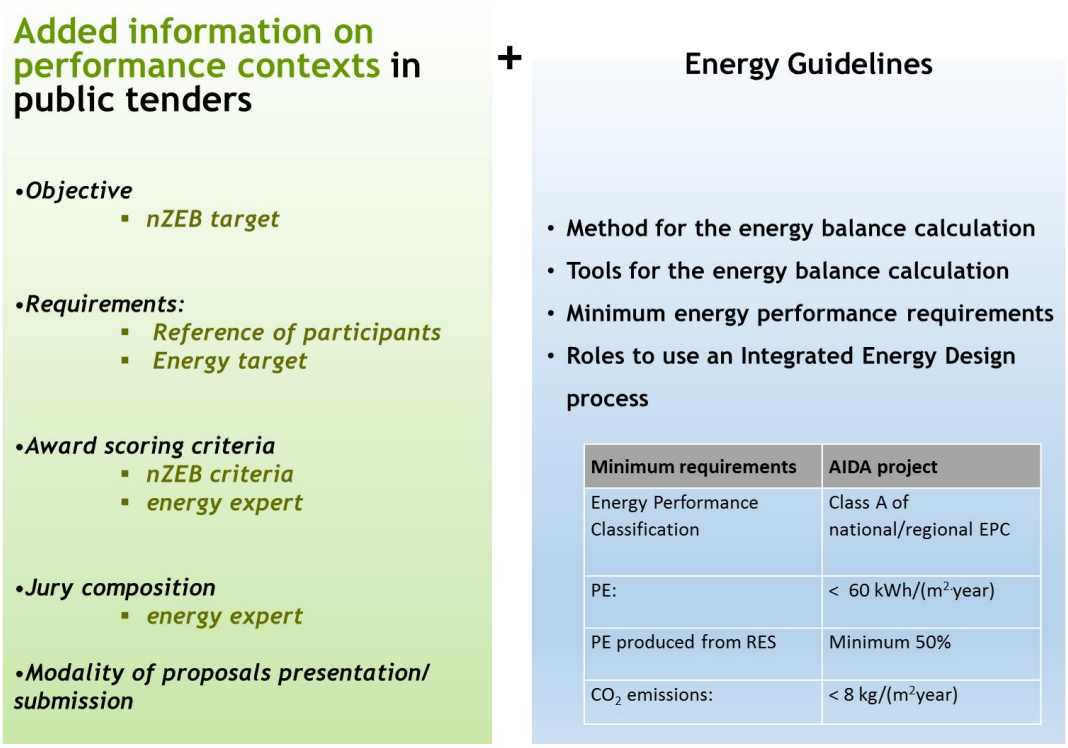


Figure 1: Sketch of added information on performance contexts (highlight on green text) and Energy Guidelines to introduce in public tenders. For additional explanations, see Deliverable 3.1.

Unfortunately, there is not a common standard to integrate the nZEB target within public tenders, because the integration is strictly related with the administrative procedures that the public administrations (municipality) decides to use. The results obtained vary from a definition of the design team, to the definition of the best design project (preliminary, definitive or executive design) or the definition of the construction company that will build the building, or both of them (definition of the design proposal and building construction).

2.2.1 Design contests or design tender competition

"'***Design contests'*** *means those procedures which enable the contracting authority to acquire, mainly in the fields of town and country planning, architecture and engineering or data processing, a plan or design selected by a jury after being put out to competition with or without the award of prizes*" (Deliverable 2014/24/EU, art. 2, comma 1, point 21).

The design tender competition (call for tenders) aims to support the definition of the best design proposal among a wide number of competitors, evaluating different technical/functional aspects, such as:

- aesthetics / architectural quality
- urban integration
- functionality
- compliance with architectural plan: minimum surfaces, functions, etc.
- technical and structural consistency
- energy and environmental impact

- indoor environmental quality (temperature, relative humidity, light, CO2, acoustics, etc.)
- requirements by end users / owner / investor, with regard to interior comfort and what the building must "communicate"
- energy balance (nZBE target)
- durability and maintenance
- costs (building construction and management)
- others, ….

In relation to the goal of the design contest, some of these aspects weigh more than others; that is, a higher score is assigned when the target is achieved.
From the point of view of the nZEB target, in this kind of procedure it is possible to require an energy balance calculation in order to understand how close/far to the target the proposed design is.
To this end, we defined 'Energy Guidelines', including:

- method for the energy balance calculation[1] (see Deliverable 3.1, Chapter 5)
- simulation tool
- minimum energy performance/nZEB criteria with relative scoring system.

A design tender competition should contain the necessary information and tools to allow participants to use the same method for the energy balance calculation, in order to make comparable performance results coming from different architectural and engineering proposals.
To achieve the nZEB target means, first of all, a high-energy efficiency building. For this reason it is best practice to define minimum requirements for the energy performance indexes (see Figure 1). Another aspect that can help in the identification of the 'best solution' from a cost/benefits point of view (including construction and management costs), is the analysis of the cost optimality [1], not developed within the AIDA project. Once again the method for the costs/benefits analysis must be presented in the tender text.
In our case studies, the terms of the building energy balance were calculated by national/local calculation tools, already available for the Energy Performance Certificate (EPC). When an EPC tool was not able to calculate all the needed terms (e.g. energy production by a RES), other tools[2] were supplied. For the nZEB final balance calculation we used the '*Net ZEB Evaluation Tool*'[3] developed by IEA SHC Task 40/ECBCS Annex 52: Towards Net Zero Energy Solar Buildings.

Usually, the building design tender participants have to deliver all the requested documentation in printed format, in order to maintain anonymity. This means that the data input insert in the energy balance calculation and the energy performance results should been printed.
It is good practice is to organize a mandatory meeting for the participants when the contracting authority (the municipality) presents the goal of the design tender and requirements for the building. On this occasion, they will present the nZEB target (the method for the energy balance

[1] Method for the energy balance calculation: see Chapter 3.1.2, about 'Energy performance requirements part introduced in the public tender Guidelines for the energy concept of the new elementary school of Sinigo, Municipality of Merano.'
[2] For simulation tools see Deliverable 3.1
[3] http://task40.iea-shc.org/net-zeb

calculation and the simulation tool) and the IED process (for the potential of this multidisciplinary and collaborative process, management and rules, see Deliverable 3.1 Annex I).
During the elaboration of the design proposals design teams can already use the IED process, in order to define the best solution taking into account a wide range of possibilities, including qualitative, functional, aesthetic, economic (cost/benefit) aspects and energy performance of the building.
In the evaluation phase, within the jury there should be an expert specialized in nZEB, high energy efficiency buildings and RES, able to check the energy performance results reached by the participants.

To motivate and boost the participants to achieve the nZEB target, the contracting authority should budget, together with the other usual costs (architectural, static, electric, hydraulic, etc.), a specific budget for the development of the building as an energy system (in other words "the energy strategy") and for the assessment of the energy performances and the energy balance.

2.2.2 Public service contracts

'***Public service contracts'*** *means public contracts having as their object the provision of services other than those referred to in point 6",* the execution, the design, or both. (Deliverable 2014/24/EU, art. 2, comma 1, point 9).

This kind of procedure defines public service contracts for the design service or for construction service of the building, or both together.

i. Public service contracts for design service

The public service contracts for design service are often used at the beginning of the design process, when the local authority needs a building designer. Through this kind of procedure, the authority looks for a design team, within a wide number of participants.
The winner design team is usually chosen through the financially most advantageous offer, but within the technical award criteria must be included:

- skills and expertise of the energy expert
- rough energy strategy the team would like to use to achieve the nZEB target

To compare the experiences of the participants, or the energy strategies, the participants should present information to show their potential.
In the classical process, usually the winning design team will submit a design proposal (preliminary design) after being designated as the winner. This means that only a design project is annexed into the bid package submission.
An exception to the above is when the local authority requires the participants to elaborate a 'concept design', ie sketched drawing of their ideas.
In the new innovative process, during the design phase, it is suggested to use the Integrated Energy Design process. This kind of approach increases the quality of the architectural proposal from different points of view (aesthetic, functionality, energy performance, management, construction cost, etc.).

ii. Public service contracts for construction design

The contracting authority uses this kind of procedure when it needs a construction service, such as the construction of a new building or refurbishment of an existing one.
In order to achieve a high energy performance, minimum energy performance requirements[4] must be introduced into the tender documents, and should be assessed through measurements.
This means that before writing this kind of tender it is good practice to analyse the energy performance of the last building design proposal (definitive/executive design) and define the minimum indexes of the thermal-physical parameters that will be introduced into the tender documentation for building companies.
Consequently, the bidding companies will propose technical solutions that are capable of achieving the minimum energy performance requirements. If it is necessary to calculate the energy balance, it is necessary to define (or supply) in the tender documentation the energy balance calculation tools as well as the method for the energy balance calculation.
Within the evaluation committee (jury) there should be at least one energy expert able to verify the proposed energy efficiency solutions.
In this kind of procedure, the contracting authority should specify at least two years of commissioning and building monitoring from the builder. This duration is very important to verify the whole building system regulation and periodically calculate an energy balance using the actual energy consumption and production, while assessing indoor environmental quality level. The contractor should furthermore be required to implement at best the proposed solutions, as well as implement the monitoring, and post-process the acquired data, if an economic award is foreseen for achieving the nZEB target.

iii. Oral agreements

Municipalities or public authorities e.g. in Austria, often use a kind of “oral contract” within the Construction Tendering process when the size of the construction project is not too big, and if the municipality or public authority wishes to employ a regional company. They often do this via affiliated companies where this process is easier to manage by law. It does not matter if the contract is written or not – both option are legally possible, this type of procedure is written in § 41. of the Austrian Law on “Construction Tendering and Contract”[5] and is often used when the amount of the tendering can be legally split into parts with a contract value lower than EUR 100.000,- (without VAT). The representative of the municipality, the affiliated company or authority awards a contract directly to a specific company when it is notoriously recognised as reliable and/or as the best option for carrying out specific construction technology (such as insulating with natural materials etc.).
Thus, if these points are met, an oral agreement is equal to a tender and legally binding. This is the case for the work undertaken in AIDA with the municipality Hartberg in Austria.

[4] Within AIDA project the work of definition of minimum energy performance requirements is been made in the collaboration called feasibility/preliminary studies, for example see Annex I.
[5] „Bundesgesetz über die Vergabe von Aufträgen (Bundesvergabegesetz 2006 – BVergG 2006)“, https://www.ris.bka.gv.at/GeltendeFassung.wxe?Abfrage=Bundesnormen&Gesetzesnummer=20004547, and information of the Austrian Economic Chamber under https://www.wko.at/Content.Node/Service/Wirtschaftsrecht-und-Gewerberecht/Vergaberecht/Vergabeverfahren/Wahl-der-Vergabeverfahren.html, both accessed at 16th Febr. 2015

2.3 Tools used in the project

The following tools were used:

- GEQ (Austrian tool for EPC) - GEQ is very clear and easy to use. The software tool allows a quick overview of the energy performance of the building. Detailed analyses of the building performances are not possible, but this is due to the calculation method of Austrian EPC and not due to the software tool.
- ProCasaClima 2014/2015 (Italian tool for EPC). Realized by KlimaHouse Agency of the Province of Bolzano. The tool is based on sheets of an Excel file. It allows one to analyse the building performance and calculate the energy balance of the building. It is a static tool, but there is the possibility of a dynamic calculation.
- TEE-KENAK (Greek tool for EPC). The national building code sets the requirement for all new buildings (or existing buildings undergoing major renovation) to be of class B. In all of the preliminary studies, solutions that would reach the highest or one of the highest classes of the building code have been examined.
- Econ calc (tool for life cycle cost assessment of different building options) - is very interesting for municipality, planners and architects to use for all building construction works in planning stages to see life time costs.
- PVTOOL_AE_Vers.5.3 (PV simulation tool of the Austrian Energy Agency) – it allows a quick calculation of different variations using PV and related economic perspectives.
- iDbuild (room comfort simulation tool) – it shows the complexity of the indoor environmental quality using different ventilation and shading system solutions.
- DAYSIM (free dynamic daylight and electric lighting loads simulation tool) – it can be used to determine the best solution in passive architectonic designs (e.g. skylights' orientation in relation to energy efficiency and visual comfort for the users)
- TRANSOL (dynamic simulation tool to predict and design solar thermal installations, based on TRANSYS), to establish the best glazing area materials and optimal thickness of insulation to reduce the energy demand and increase the output of solar thermal collectors.
- TRNSYS (dynamic energy simulation tool), to establish optimal thickness of insulation for reduce energy demand.
- EnergyPlus (realized by U.S. Department of Energy) is a dynamic tool that allows users to calculate the energy performance of a building, including a large number of aspects and features in order to optimize the building design.
- A range of tools have been utilized on projects. The Greenspace range of Modeller, EPC and gEnergy [AIDA version] has enable a high level of support to the design process. On one project Ecotect was utilized by the Architects to validate and check the gEnergy outputs. Following Model construction the EPC tool produced an early Energy Performance Certificate to ensure that the design would comply with the Building Regulations. Building enhancements were then taken through gEnergy as the design progressed.

3. Case studies

One of the most important outcomes of this project is the realisation of a number of collaborations: in total twenty-eight (28) case studies, considering feasibility/preliminary studies and public tenders, were analysed. All the case studies are included in this document in English (Annex I), while we decided to translate only two examples of two different procedures into the AIDA partner languages: a tender for a design competition and a tender for a service competition (negotiated tender to choose the design team).

The case studies focus on the introduction of nZEB target and development of the IED in different public design tender procedures. They show an innovative strategy that should be followed by local authorities that aim at achieving the nZEB target for their buildings.

We decided to translate these experiences into different languages to allow for this innovative approach to be replicated and reused for further cases.

All the case studies involved in the AIDA project are summarized in a template, consisting of:

1) **General information**, a fact sheet that summarizes building data such as:
    - owner, function, dimensions, costs (for the design, construction, etc.) and the provenance of funds
    - public design tender: type of administrative procedures, energy performance requirements (national-local energy performance laws), other target goals, tools for the energy balance calculation, raking points, etc.;
    - tender results: number of participants, energy strategies proposed, positive and negative aspects, issues and barriers found;
    - climate description: geographic coordinates, yearly solar radiation, climate characteristic (extreme summer and winter seasons);
    - IED process: description of the work team and the work done by each of the partners involved;
    - support activities before, during and after the time frame of the public tender.
2) **Energy performance requirements included** in the public tender documentation. This innovative part contains the energy requirements completed with the methodology of energy balance calculations, weighting factors, evaluation criteria, rules and definition of the Integrated Energy Design process. In some case studies this part has been linked to the tender and called ‘Energy Performance Guidelines’. [2]
3) **Score system and methodology for the evaluation of the performance results in the different proposal**, only in design public tenders. [3]

Table 1: Two case studies about nZEB targets in public tenders

Partner	Municipality involved	Building	Kind of tender	State of the tender	Action carried out	n of bids	Participation on the Jury
EURAC (IT)	Merano, Italy: Signed agreement Signed Letter of affirmation	New elementary school	Service Competition: negotiated tender to choose the design team	1) Tender published in April 2013 2) Deadline for proposals: 22.05.2013 3) October 2013, evaluation of the tenders submitted. Eurac joins the jury for the evaluation of the energy strategy section. 14 designs by participating teams were evaluated. 4) Support of the IED process in the next design phases (preliminary, definitive and executive design) during 2014.	TENDER PLANNING Close collaboration with the Municipal team to introduce energy performance requirements, methods for the energy balance calculation, energy evaluation criteria for ranking, and other necessary specifications in the public tender. Public tender published. EVALUATION OF THE RESULTS: Collaboration with the Jury for the evaluation of the results. COLLABORATION WITH THE WINNING DESIGN TEAM AND THE MUNICIPALITY: Use of the IED process for the management of the work team (experts, designers, public representatives, …). Modified the local tool used for the Energy Performance Certificates (EPCs), in order to automatically calculate the energy balance of the design proposal.	16	Yes, supporting the Jury in the evaluation of the energy strategy.
IREC (ES)	Barcelona Spain	New Civic Center- District Head Office, library and city archive.	IDEAS COMPETITION TENDER Harmonized tender to choose the design team by graphical and technical proposal	1) Ideas competition tender published 28/08/2013, Deadline for proposals: 26/09/2013. 2) Participation in the Jury in October/November 2013, where 58 graphic and technical proposals were evaluated. 3) Support the IED process in the next design phases (preliminary, definitive and executive design) during 2014/2015.	TENDER PLANNING: Support the Municipality during the development of the ideas tender to include and establish an IED process from the beginning of the different phases of tender. The objective of this collaboration was to establish minimum requirements and define the nZEB sections, assist in the jury, and support the next design phases: 1) Establish Energy Efficiency specifications on “Ideas competition tender for service contract to choose the design team. 2) Integrate the Jury to evaluate the proposals (Energy Efficiency specifications) 3) Collaborate in the next design and tender phases, monitoring the IED process. EVALUATION OF THE RESULTS: Collaboration with the Jury for the evaluation of the results. COLLABORATION WITH BIMSA AND DESIGN TEAM WINNER: The ideas tender competition is concluded in December 2013.	58	Yes, assisting the Jury in the evaluation of the energy strategy.

					IREC supported BIMSA in the awarding of the Energy Efficiency scoring. IREC are collaborating with BIMSA and supporting the winner design team in the preliminary design phase (monitoring the IED process through 2014) NEXT ACTION: The definition of the preliminary design phase, for the moment, is on hold (discrepancies between surface distribution and uses). The resumption of the preliminary design and the next design phases is expected soon. Support for the design team and BIMSA in the definition of the definitive and executive design phases and monitoring of the IED process is expected in the next design phases (during the framework of AIDA project in 2015)		

3.1. Italy: Municipality of Merano

3.1.1. General information

AIDA AFFIRMATIVE INTEGRATED ENERGY DESIGN ACTION

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

EURAC research

Public design tender for a nearly zero energy building story card

GENERAL INFORMATIONS

Owner:	Municipality of Merano
Use:	Primary school , divede into: • Italian primary school for 160 students (8 classrooms) • German primary school for 100 students (5 classrooms) • 702 m² of classrooms • 260 m² of special workrooms • 208 m² multipurpose room • 306 m² of public library • 236 m² of administrative office • 208m² of recreation rooms • 280 m² of canteen room • 608 m² of Gym
Heated surface:	6.500 m²
Gross volume:	17.300 m³
Cost:	Total budget € 10.903.154,00 divided into: • Building construction cost €6.695.136,00 • Gym construction cost €1.760.640,00 • Furniture cost € 845.578,00 • Land cost €1.601.800,00 • Other costs € .....
Method of financing:	Municipality of Merano
Typology of design tender adopted	Negotiated tender to find the design team will design the new building

The winner is determined by the most economically advantageous offer and by its experience (curriculum). Design teams participate at the tender without any design proposals. The winning team will deal with the preliminary, definitive and executive project and will direct the construction phase too.
Despite the tender does not demand for a design proposal, the development of an energy strategy was set as obligatory requirement. To support the design teams in this task, energy guidelines were included into the tender documents.

Elementary school of Sinigo

New building
Merano, IT

TENDER
Negotiated design tender to find the design team

ENERGY PERFORMANCE CRITERIA:
- CasaClima A, for the local energy percormance calculation (heating demand < 30kWh/(m²y))
- minimum periodic thermal transmittance (Yie) for summer season
- CO2<100kg/m²year
- 40% of the total primary energy produced by RES
- 60% of the DHW load covered by RES
- minimum of 20W (of for each square meter covered) of electric production system from RES

TOOLS FOR THE ENERGY PERFORMANCE CALCULATION:
- Xclima or CasaClima Pro* (*dynamic version able from January 2014)

OTHER CRITERIA
- Use an IED process during the design development

RAKING POINTS:
The evaluation criteria consist of design architectural proposal, dimension, cost, urban integration, innovation, quality, functional aspects and daylight of connections areas (30 points), and law accomplishment construction, maintenance and operating costs, criteria to achieve nZEB target, experience of the Energy Adviser/Certifier and design team curriculums (30 points). The design team has to deliver a description of the energy strategy (passive and active solution), planned to reach the fixed energy targets through a technical report (6 points).

TOOLS USED DURING THE DESIGN PHASES TO EVALUATE:
The energy performance: Energy Plus....
The energy production: Pvsol

ENERGY PERFORMANCE RESULTS OBTAINED	
Primary energy consumption (without considering RES production)	32,18 kWh/m²y
CO_2 emission (without considering RES production)	6,37 Kg CO_2/m²y
PV production	6,84 MWh/y
CO_2 emission saving with PV system	3,30 Tn CO_2/y
Solar Thermal production	36,90 MWh/y
Estimated saving of primary energy/year	275,09 MWh/y
Estimated saving of CO2 emissions /year	116 Tn CO_2/y

EURAC evaluated each project from the energy point of view and presented the results to the Municipality's evaluation jury.

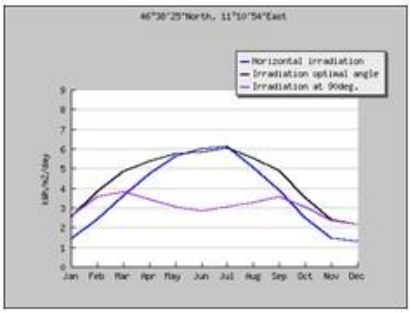
RESULTS OBTAINED
- Despite the tender does not demand for a design proposal, the development of an energy strategy was set as obligatory requirement for the participants
- All the participants have developed an energy strategy. In some case they have proposed a design solution, with floor plan, facades and environmental integration. In these cases, the design proposals seemed to influence the architectural project in a advantageous way to achieve the nZBE target, though an high energy efficiency of the building and renewable energy production systems on-site.

Elementary school of Sinigo

New building
Merano, IT

DESCRIPTION OF THE CLIMATE:
Municipality of Merano

Address:	Via Pedimonte – Via XXIV Maggio, Merano
GPS:	Location: Merao 46.64124, 11.18204
Altitude:	263 m
Yearly solar radiation: (graphic)	3.68 kWh/m² *day (Average sum of horizontal global irradiation per square meter received) 1340 kWh/m² (Average sum of horizontal global irradiation per square meter received) (http://re.jrc.ec.europa.eu/pvgis/apps4/pvest.php)
HDD20 (http://www.degreedays.net/):	HDD20= 3150 Merano, IT (11.15E,46.68N)
CDD26 (http://www.degreedays.net/):	CDD26= 113 Merano, IT (11.15E,46.68N)
HDD20, Italian Classification: (italian law: n. 412 26/august/1993)	HDD20= 2.863 Merano



IED PROCESS

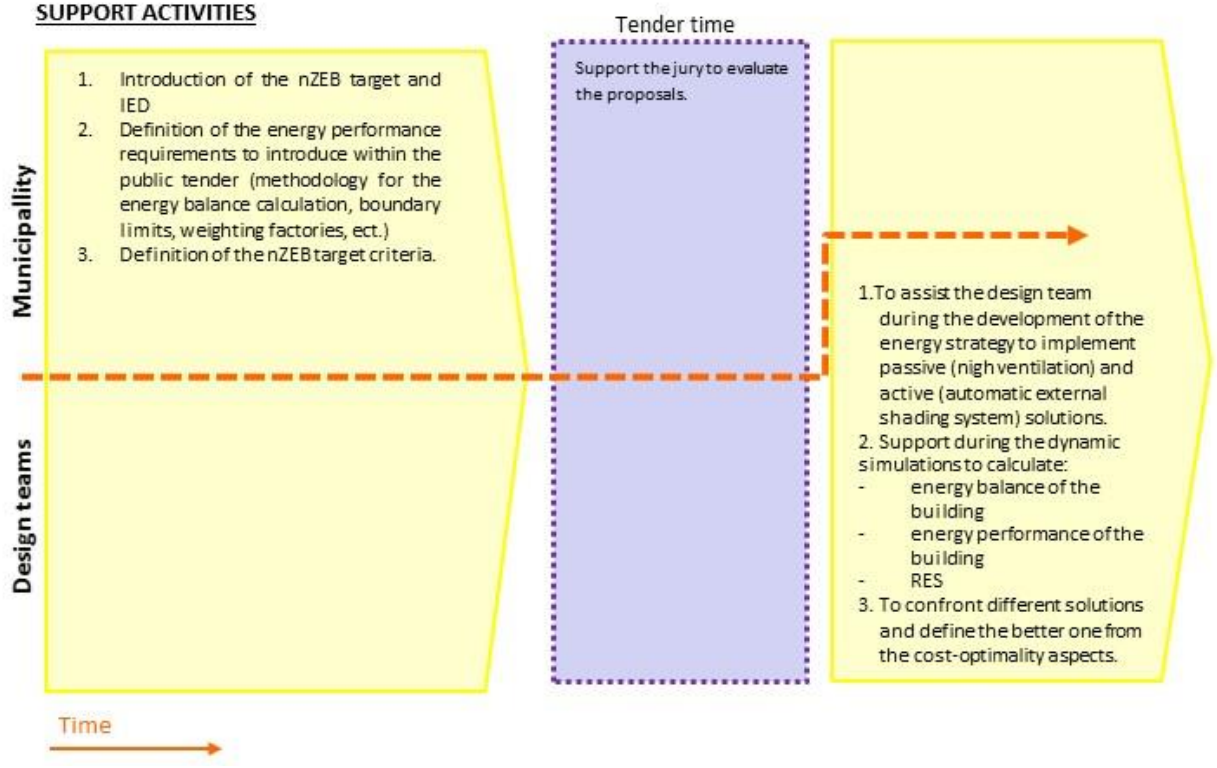
Composition of the team to realize the tender: EURAC team
different representatives of the Municipality of Merano
design team

Work done by EURAC team:

- Management of the IED process
- Support the Municipality to introduce in the negotiated tender:
  - Defining the energy performance requirements to introduce in the tender (from the method for the energy balance calculation to the physical boundary of the building data, to the weighting factors…)
  - Despite the tender does not demand for a design proposal, the development of an energy strategy was set as obligatory requirement for the participants
  - Defining the evaluation criteria

To do: Assist the design team during the development of the energy strategy and during the energy simulation phase.

SUPPORT ACTIVITIES



Elementary school of Sinigo

New building
Merano, IT

SUPPORT TO THE MUNICIPALITY AND DESIGN TEAM

2010

The Municipality of Merano needs a new elementary school for Sinigo.
The Municipality decides to use a negotiated tender design procedure to chose the design team that will design the building.

September 2012

Municipality of Merano signed an agreement to participate into AIDA project.
At the same time a close collaboration between the Municipality and EURAC team starts to introduce the energy performance requirements part within the public tender.

- Organization of workshops to introduce the nZEB concept (high energy efficiency building and RES) to the staff of the municipality involved into the project.

February 2013

Draw up the energy performance requirements part, a document called 'Energy guidelines', annexed to the tender, about these topics:

- nZEB definition (from EPBD 2010/31/EU, "IEA SHC Task 40 – ECBCS Annex 52: Towards Net Zero Energy Solar Buildings")
- energy performance indicators (energy balance, heating/cooling/electric demand, IEQ level, etc.)
- energy calculation methods (tools and methods)
- evaluation methods (ranking procedures through assignment of points and weighted sum).

In addition to this guide lines, in the tenders should be reported the national/local laws that fixes the energy performance indexes. In the Province of Bolzano, CasaClima Agency is the public authority in charge of establishing the energy performance requirements, and verifying them, for new and existing buildings through an energy certification performance (ECP) procedure. The CasaClima certification defines energy performance classes based on envelope performance during the heating season.

March 2013

Endorsement of the tender and the "Energy guidelines".
Translation of the design tender in German language.

April 2013

Publication of the negotiated tender design.

June 2013

Tendering procedure evaluation and results.

October 2013

Evaluation criteria
EURAC team evaluated each project from the energy point of view and presented the results to the jury's Municipality.

February 2014

Define the Design team winner.

1st April 2014

First meeting for the work team composed by:

- Municipality: Public Project Manager, geologist, expert fire protection, etc.
- Design team: architects and mechanic engineering
- EURAC team: export in energy performance building and RES

14 April 2014

Start the Preliminary design phase (Deadline time 34 days, 17 April 2014)

21st April 2014

IED meeting: first meeting between EURAC, Municipality and design team.

May 2014

EURAC supplies a simplified version of the energy simulation tool to the design team. This tool is similar to the energy certification tool used in the Bozen Province and is able to calculate the energy balance of the design proposal.

6 June 2014

Deadline for the preliminary project

29 June 2014

IED meeting: meeting between EURAC, Municipality and design team. The design team is 'worry' about the nZEB target, they prefer to use the 'common' procedure and the common energy target.

September 2014

Meeting with the working team: introduction of passive solutions in the preliminary design, such as horizontal window on the stairs and night natural ventilation.

November 2014

Suspension of the design process due to public administrative features between 'Urban Department office' and 'Department of Water and air office' of the Municipality.

3.1.2. Energy performance requirements section introduced into the public tender

Guidelines for the energy concept of the new elementary school of Sinigo, Municipality of Merano.

The present document aims to define the energy requirements and promote Integrated Energy Design (IED). The objective of this document is to support the design teams during the development of the energy strategy to achieve the nZEB energy performance target for the new elementary school.

On the basis of the information here, it is required that each design team provide a document to explain thier energy strategy to achieve the nZEB target, with passive and active solutions and/or energy strategies. The document will be in A4 format with text and sketches.

a) Legislative framework towards zero energy buildings

The Directive EPDB 2010/31/EU on the energy performance of buildings constrains the Member States to ensure that from 31 December 2018 all new buildings occupied and owned by public authorities achieve nearly zero-energy targets.

The Directive defines: 'nearly zero-energy building' as meaning a building that has a very high energy performance,(…). The nearly zero or very low amount of energy required should be covered to a very significant extent by energy from renewable sources, including energy from renewable sources produced on-site or nearby[6].

In March 2013, the Province of Bolzano approved a province deliberation n.362/2013 to implement the European Directive 2010/31/EU on the energy performance of buildings in the local procedures.

b) Objective: design project of a new nearly or Net Zero Energy Building (nZEB or NZEB).

The energy target for the new elementary school of Sinigo is established as nearly zero energy building, which should be achieved through an integrated energy design process (IED).

A nearly zero energy building is a building that produces energy on-site from renewable energy sources in quantities as needed. Technical solutions have to be integrated in the building or located within the boundary delimited by the point of connection to the energy grid.

High-energy efficiency of the building means a lower energy demand to satisfy.

In the energy balance, negative values will be assigned to energy demands of the building, such as heating, cooling, electric, DHW, ventilation, light, auxiliaries, plug loads, etc... On the contrary positive values will be assigned to energy production (thermal and electric) generated on-site (directly on the building or within the boundary of the building area).

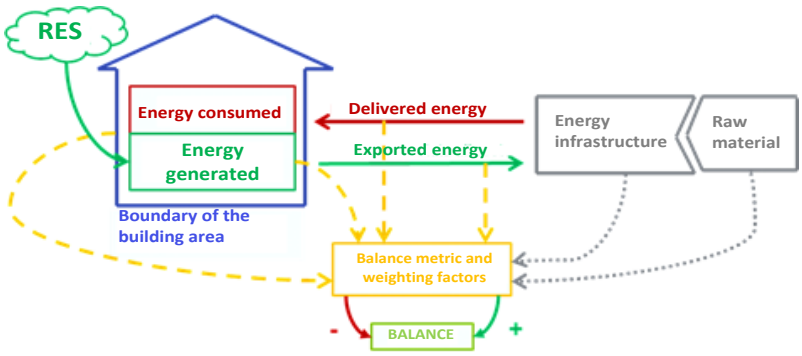


Figure 2: Energy balance from delivered energy (or load) and exported energy (generation) to the grids.

Through the AIDA project, the design team can benefit from the active support of EURAC during the calculation of the energy balance of the building.

Another important goal is to achieve high-energy efficiency building requirements on a good cost-optimal level, considering the lowest cost of the estimated economic life cycle.

The European Directive 2010/31/EU defines that 'the lowest cost is determined taking into account energy-related investment costs, maintenance and operating costs (including energy costs and savings, the category of the building concerned, earnings from energy produced), where applicable, and disposal costs, where applicable'. The cost-optimal level shall lie within the range of performance levels where the cost benefit analysis calculated over the estimated economic lifecycle is positive.[7]

The technical solutions will be discussed during the integrated energy design (IED) process as part of the evaluation of cost-benefits.

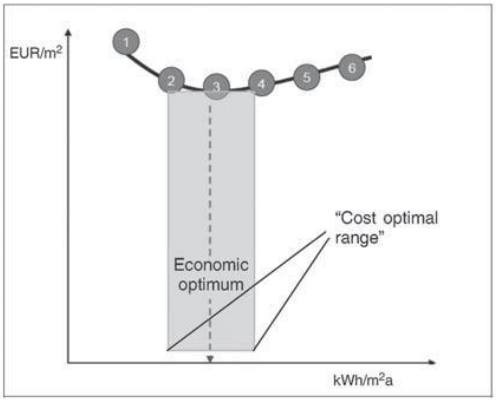


Figure 3: Different variants within the graph and position of the cost-optimal range.8

The Figure 3 shows in the x-axis the primary energy demand (W/m²K) and in the y-axis the global costs of each solution (€/m² for useful floor area). The point 3 indicates the cost-optimal level. Points to the left of point 2 indicate solutions characterized by lower energy demand and high global costs

[7] European Directive EDB 2012/31/EU of 19th May 2010 on the energy performance of buildings (recast).

[8] C115. Office Journal of Europe Union. 19th April 2012.

(construction and maintenance costs). On the contrary, points beyond point 4 indicate solutions with high global costs and low energy efficiency.

c) Integrated Energy Design, IED

The design team is committed to use an integrated energy design (IED) process, a collaborative multidisciplinary procedure to analyse different solutions developed during all phases of the process.

In the IED process different professionals and stakeholders (owner, design team, tenants…) work together in team to integrate efficiently their personal knowledge in order to analyse and evaluate a wide number of solutions.

Thanks to the AIDA project the EURAC team will support the design team during the preliminary and definitive phases. Specific meetings and workshops will be organized and active assistance will be offered to evaluate energy simulations and indoor comfort.

The objective of the design project is to achieve the best balance between the occupants needs and technic/functional requirements:

- Aesthetic /architectural quality
- Functionality
- Energy and environmental impact (active and passive systems)
- Indoor environmental quality (temperature, relative humidity, day lighting, CO_2, acoustic, etc.)
- Other needs for increasing the internal comfort or specific necessities of the tenants or the Municipality of Merano.
- Durability and maintenance.
- Methodology calculation of the energy balance

d) The core of the Net ZEB issue is the balance between delivered and exported energy.

During the design phase the energy balance will be calculated taking into account the energy produced on-site and in the boundary system by renewable energy sources and energy exported to the grid, as well as energy imported to the building in order to achieve an appropriate level of internal environmental comfort.

All energy demands of the building will be included in the energy balance (heating, cooling, domestic hot water, ventilation, auxiliaries, lighting and every kind of plug loads). The energy balance must be calculated in terms of primary energy, using the weighting conversion factors (shown in Table 2).

The energy balance between imported and exported energy is an approach to evaluate the building-grid interactions in particular for deducting the quantity of energy generated and used directly on-site

$$\sum_i g_i \cdot w_{e,i} - \sum_i l_i \cdot w_{d,i} = G - L \geq 0$$

where:
i = energy carrier

gi = generation of the i-th energy carrier
li = load of the i-th energy carrier
we,i = weighting factor for exported i-th energy carrier
wd,i = weighting factor for delivered i-th energy carrier
G = weighted generation
L = weighted load
The energy balance is a yearly balance and will been calculated by dynamic simulations during the design phase.

e) Definition:

The Physical boundary of the building system

The physical boundary of the building is used to identify the location of "on-site" generation systemsand energy demands. A generation system within the boundary of the system is defined on-site.

The physical boundary of the system coincides with the urban area, as defined in Resolution of the Province of Bolzano No. GP. 4179 of 19.11.2001 Art. 1. In this way installations which are not integrated into the building are allowed only if located in the building area before the point of connection to the power grid

Integration of the energy generation systems

Systems of energy production will be integrated into the building and/or into the boundary of the building system and will use renewable source. Energy shall be generated by renewable sources.

In order to guarantee a high aesthetic building value, the integration of energy generation systems must be integrated from the beginning of the project. These systems can be integrated into the architectural elements of the building or in others elements located within the boundary system limits (for example integrated into the bus shelter of the parking area).

Weighting factors

Table 2: Weighting factors symmetrically equivalent CO_2 emissions. Source: Province of Bolzano, Dgp 362 of March 2013.

Energy vectors	kgCO2eq/kWh
Electricity	0.647
Liquid fuel	
fuel oil extra light	0.290
fuel oil light	0.303
liquefied petroleum gas (LPG)	0.263
rapeseed oil	0.033
Gas fuel	
natural gas	0.249
Biomass	
wood chips	0.035
briketts	0.055
Pellets	0.042
Heat from district heating plants :	

fuel oil	0.410
natural gas	0.300
fuel oil with cogeneration	0.280
natural gas with cogeneration	0.270
rapeseed oil	0.150
rapeseed oil with cogeneration	0.180
wood with a natural gas boiler for peak	0.125
wood with oil boiler for peak	0.150
wood boiler with rapeseed oil for peak	0.100
waste to energy (WTE)	0.150

Minimum energy requirements of the new building

The energy concept of the school of Sinigo will be to achieve the national and local energy performance requirements as well as nearly zero energy building targets.

The Commission for the validation of the project can require CasaClima Certification during all the design phases, preliminary and definitive phase, in order to check thermal energy demands and primary energy demand of project.

EURAC will support and assist the design team for the dynamic energy simulation required to analyse indoor comfort, day lighting and over-heating values during the summer season.

Definition of energy optimization parameters.

During the project design, different meeting and workshops, will be organized on energy topics and arguments, which range from larchitectural elements of the building envelope to plant systems will be organized.

Design teams have to explain the energy concept as well as their experiences and abilities in applying technical solutions through a list of references, in order to increase the energy saving, building efficiency and indoor comfort of the future building.

Participants requirements

Participants are aware of the energy targets, which have been established in the public design tender. Requirements are mainly related to the specific use of buildings and its operational hours (classrooms, gym, library…) with different levels of indoor comfort.

It is necessary, that the design team includes an energy adviser/certifier, with experience in energy efficient planning.

The curriculum vitae of the energy adviser/certifier needs to be attached to the proposal.

3.1.3. Results of energy criteria evaluation

Results of the energy performance part of the 'Public tender for the design, planning supervisor, safety manager during the design and construction phases for the realization of the new elementary school of Sinigo.[9]

This report summarises the analysis of the assessments of the energy performance results of the participants within the energy strategy to achieve the nZEB target criteria and for the experience of the Energy Adviser/Certifier.

a) Achievement of nZEB criteria

A maximum of six points can be awarded for this criteria.

In view of a nearly zero-energy building (nZEB) - a building that has a very high-energy performance with a nearly zero or very low amount of energy (thermal and electric) needs, with energy needs supplied by on site production from renewable sources, points are assigned according to the energy strategy proposed.

- Positive aspects of the energy strategy;
- More ambitious goals (such as CasaClima Gold, Nature, Passive House, other environmental requirements…) compared to the energy performance requirements fixed within the public tender (CasaClima A);
- Sketches and drawings of the design proposal to support the energy concepts[10];
- Thermal and physical characteristics of the building's envelope, sustainability of the proposed materials, strategy for energy efficiency, active and passive solutions, monitoring, LED and other innovative solutions;
- Detail of the power plant concept development and use of the renewable energy source;
- Evaluation of the energy balance.

Assessment results of the nZEB target criteria for the candidates:

[9] Gonzalez Matterson, M. L; Paoletti, G., Salom, J. (2014) "*Evaluation of the energy performance strategies in competition tenders to achieve nearly Zero Energy Buildings: two case studies in Barcelona and Merano*." World Sustainable Building Congress -WSB14, Session S101: pp.8-14. Barcelona, Spain, 28-30 October 2014.

[10] Remember that, for this kind of public procedure called 'negotiated tender', the design teams participate at the tender without any design proposal. In this case, with the positive approval of the Municipality, we introduced in the 'Guidelines for the energy concept of the elementary school of Sinigo' the possibility to present the energy concept in a report with passive and active solutions and/or energy strategies. The document will be in A4 format with text and sketches.

Table 3: Assessment results of the nZEB target achievement.

No. Project	Energy Expert	Achievement of target nZEB
1	Vitre/Demetz	**3**
2	ATA, Albuzzi	**1,5**
3	Lenzi/Alberghini	**1,5**
4	Klammsteiner	**4,5**
5	Lucchin/Kerschbaumer	**3,5**
6	Landbau/Fecondo	**4**
7	Erlacher	**2,5**
8	Prossliner	**5**
9	Traldi	**5,5**
10	Larcher	**2,5**
11	Monteduro	**5**
12	Mittelberger	**3**
13	Viero	**3,5**
14	Psenner	**4,5**

b) Experience of the Energy Adviser/Certifier qualification‘s.

A maximum of 4 points can be awarded for this criteria..

Score are assigned according to the experience in energy performance building consultancy (max. 2 points) and qualification of the Energy Adviser/Certifier and knowledge of energy performance simulation tools (max. 2 points).

The energy simulations analysis done during the design phase makes it possible to to evaluate a large number of Architecturalarchitectural solutions and analyze different construction details in a shrot space of time, at a phase of building design where changes will not necessarily affect the final cost of the buildings. The ‘Guidelines for the energy concept of the elementary school of Sinigo’, linked to the public tender, requires the evaluation of the energy balance during all the design phases (preliminary, definitive and executive), though dynamic simulations. For this, two points, are assigned to the knowledge of the simulation tools.

At the same time, the professional experience of the Energy Adviser/Certifier is evaluated through analysing of their technical knowledge on high efficiency buildings during the design, consultancy, study, and building construction phases (max. 2 points).

Table 4: Assessment results concerning the experience and qualifications of the energy adviser/certifier.

No. Project	Energy Expert	Experience of the Energy Adviser/Certifier qualification
1	Vitre/Demetz	**3,5**
2	ATA, Albuzzi	**1,5**
3	Lenzi/Alberghini	**3,0**
4	Klamsteiner	**4,0**
5	Lucchin/Keschbaumer	**3,5**
6	Landbau/Fecondo	**3,0**
7	Erlacher	**3,0**
8	Prossliner	**2,5**
9	Traldi	**4,0**
10	Larcher	**2,5**
11	Monteduro	**3,0**
12	Mittelberger	**2,0**
13	Viero ZERMANI	**2,5**
14	Psenner	**3,0**

Conclusion

In this case study there were two criterias for energy performance requirements in which candidats could win points:

- nZEB target achievement (quality of energy strategy elaborated to achieve the nZEB target)
- experience of the Energy Adviser/Certifier qualification.

The overall winning design team was team number 14 composed of Arch. Simmerle, Eng. Psenner, Eng. Seppi, rated 4th in the energy performance criteria, Figure 4.

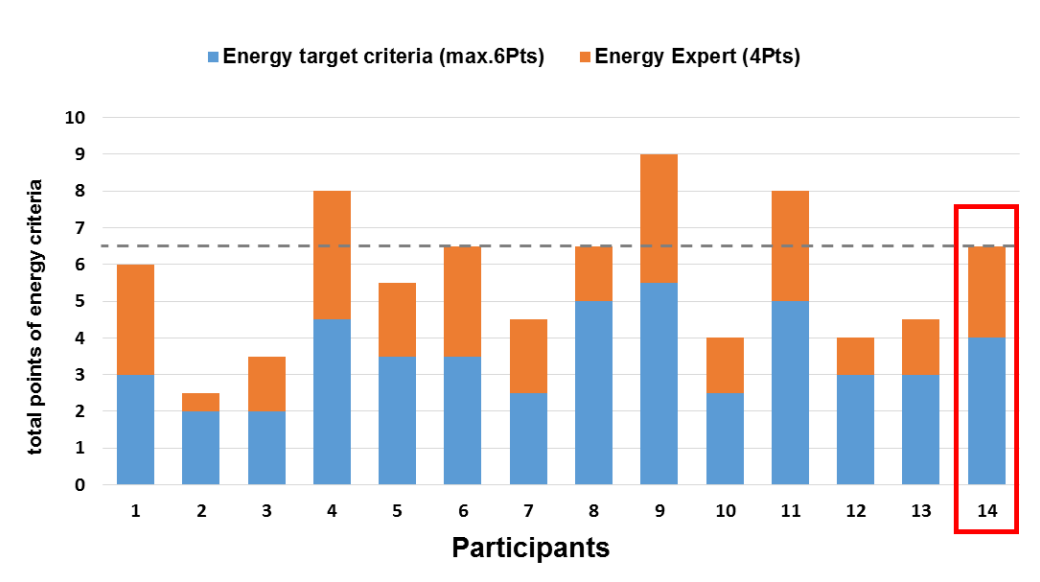


Figure 4: Total score of the participant's energy part.

3.2. Spain: Municipality of Barcelona

3.2.1. Generic information

AIDA AFFIRMATIVE INTEGRATED ENERGY DESIGN ACTION

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

IREC Institut de Recerca en Energia de Catalunya Catalonia Institute for Energy Research

Public design tender for a nearly zero energy building story card

New construction of Sarrià Square equipment

Public library, Civic Center-District Head Office and City archive.
Barcelona, Spain

GENERAL INFORMATIONS OF THE NEW SCHOOL

Owner: *BIMSA-Barcelona d'Infrestructures Municipals*
Use: Civic Center-District Head Office, Public library and City archive.
Heated surface: 4.640 m² total
District Head Offices: 1.700 m²
Public Library: 1.600 m²
City archive: 1.000 m²
Polyvalent Room: 340 m²
Gross volume: 16.240 m³
Cost: €74.147,94 (preliminary design team)
Total budget: €9.847.908.
€9.687.647 building and
€160.261 urbanization.
Method of financing:
Typology of design tender adopted:
Ideas Public Tender (Harmonized) to find the design team will design the new building.

TENDER

TYPOLOGY OF THE TENDER:

- Ideas Public Tender (Harmonized) to find the design team

ENERGY PERFORMANCE CRITERIA:

- Energy Efficiency Certification: A "grade" CTE.
- Energetic objectives= nZEB
- Limit electric demand < 75/80 kW·he/m2·year.
- Conversion factors (electric demand)
  Heating and DHW: 0.63
  Cooling: 0.45
  Ventilation, Lighting and electrical equipments: 1.0
- Energetic Balance, Primary Energy (PE)= -90 kW·hpe/m2·year (include RES generation)
- Energetic balance calculations:
  Tools: CTE mandatory LIDER-CALENER. Any that provide dynamic simulations (TRNSYS, DAYESIM, ENERGY PLUS, Etc) and achieve the justification according CTE.
  Conversion factors:
  - Natural gas: 1.07
  - Electricity: 2.28
  - Biogas: 0.12
  - Biomass: 1.0
  - Solar thermal, wind power, PV: 0.0

OTHER CRITERIA

RAKING POINTS:
The evaluation criteria consist in assign the total of 100 points. (Architectonic quality: 40p.; Compliance of Program: 10p; Energy Efficiency and LCA of materials: 20p.; Technical and structural consistency: 20p; Maximal cost: 10p)

TOOLS USED TO EVALUATE:

OTHER:

RESULTS OF THE DESIGN TENDER
The total of 58 graphical proposal have presented. All the proposal, except a very few number, have explained in the part of Energy efficiency item their strategies related with passive architecture (daylighting, natural ventilation, thermal insulation, solar protection) combine with active solutions to control and RES generation (thermal and electricity). Into the barriers can mentioned, poor architectonic integration with Energy generation system (as PV on the roof) and not all energy solutions were properly studied (uncertain feasibility).

New construction of Sarrià Square equipment.

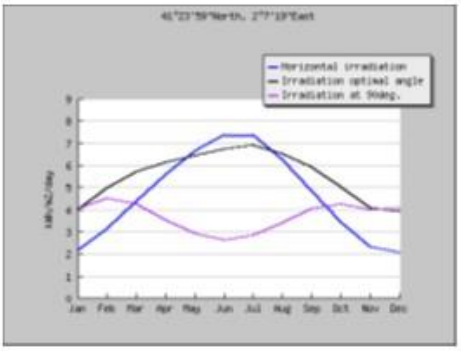
Municipality of Barcelona –BIMSA

(*Barcelona d'Infrestructures Municipals*), Spain.

DESCRIPTION OF THE CLIMATE:

Municipality of Barcelona -BIMSA-Barcelona d'Infrestructures Municipals

Address:	Plaça de Sarrià 1, Barcelona, Spain.
GPS:	Latitude: 41.399885 N, Longitude: 2.122165 E
Altitude:	126 m a.s.l.
Yearly solar radiation: (graphic)	4,63 kWh/m²*day *(average sum of horizontal global irradiation per square meter)* (http://re.jrc.ec.europa.eu/pvgis/apps4/pvest.php)
HDD_{20}: (http://www.degreedays.net)	HDD_{20}= 1530 Sant Gervasi, Barcelona, ES (2.14E,41.41N)
CDD_{26}: (http://www.degreedays.net)	CDD_{26}= 169 Sant Gervasi, Barcelona, ES (2.14E,41.41N)



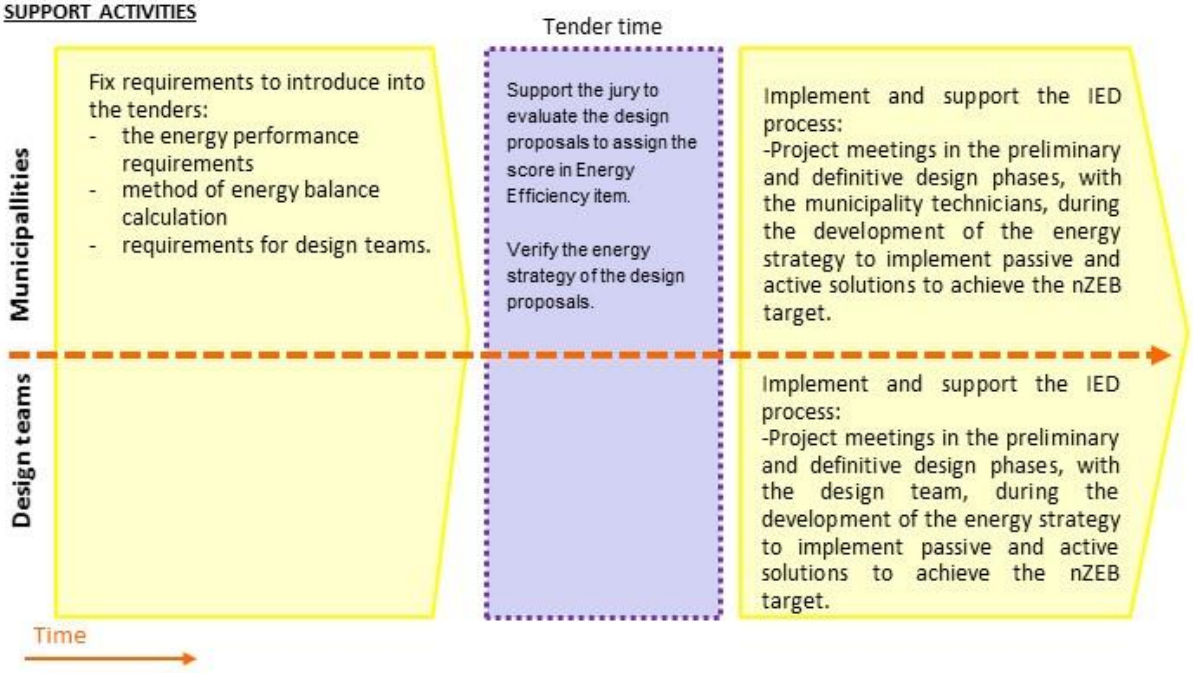
IED PROCESS

Composition of the team: IREC team
Owner
Municipality of Barcelona
BIMSA (*Barcelona d'Infrestructures Municipals)*

Work done by IREC team with the municipality technicians:

- Compilation of energetic demand from existing municipal buildings.
- Support the Municipality to introduce in the harmonized ideas tender competition:
- Defining the technical specifications to introduce nZEB energy targets and methodology to calculate the performance (and to introduce the figure of Energy and RES and energy expert in the tender).
  - Guide to include some energetic aspect in the specifications of competition tender.
  - Establish the nZEB target
  - Limited Energy Demand (electrical) and conversion factors.
  - Establish the result of Energetic Balance and conversion factors.
- Be part and support the Jury to evaluate the design proposals.
- Supporting BIMSA and the Design team into the IED process in the preliminary and basic design phases (meetings, recommendations, etc).
- Monitoring the IED in the next tender phases (executive design, construction works).

SUPPORT ACTIVITIES



New construction of Sarrià Square equipment.

Municipality of Barcelona –BIMSA

(*Barcelona d'Infrestructures Municipals*), Spain.

SUPPORT TO THE MUNICIPALITY AND DESIGN TEAM

(describe the collaboration with the Municipality to introduce energy performance requirements into the design tenders and how the integrated design process (IED) works)

October–December 2012

The Municipality of Barcelona needs a new public equipment in Sarrià square.
First contacts established between BIMSA and IREC, in the framework of AIDA project.

January-May 2013

The Municipality decides to use a ideas competition tender procedure to chose the design team that will design the building.
A collaboration between the Municipality and IREC team starts to introduce the energy performance requirements part within the ideas public tender.

May –August 2013

Three meetings were realized and mailing communications to introduce the nZEB concept (high energy efficiency building and RES) with the staff of the municipality involved into the project.

August 2013

Ideas tender in process, published from 07/08/2013, and proposals will be presented: **26 of September of 2013.**

October – November 2013

The IREC integrated the Jury of the ideas public tender to evaluate the submissions, in terms of nZEB requirements, to establish the contract awarding for the preliminary design phase *(Serveis de redacció del projecte de la nova construcció per a l'equipament a la Pl. Sarrià -Biblioteca, Arxiu municipal i Seu del districte- al districte de Sarrià - Sant Gervasi).*

Jury meetings:
four sessions in October-November 2013.
10/10/2013: *The jury has evaluated 26 proposals in detail of 58 which have been presented. The principal arguments used were e architectonic quality (architectonic language, relationship between the plaza and the neighborhood, and program and functional definition etc.)*
17/10/2013: *The jury has evaluated another 26 proposals in detail. The principal arguments used were e architectonic quality (architectonic language, relationship between the plaza and the neighborhood, and program and functional definition etc.)*
24/10/2013: *The jury has discussed in detail about the 6 proposals remaining. The principal arguments used were e architectonic quality, energy and efficiency items, etc., to prepare a draft version of final scoring.*
06/11/2013: *BIMSA with IREC have discussed the criteria, in detail, to assign the final score in the Energy Efficiency specifications with the Jury. The 58 proposals presented were reviewed to assign the detailed scoring in Energy efficiency item.*
07/11/2013: Last Jury meeting. Assign the order to the 1st, 2nd and 3th places (over 6 final proposals). BIMSA explain the method to assign the score in the different aspects (also the Energy item discussed with IREC). The design team winner is OP TEAM ARQUITECTURA, SLP.

Render images of the winner project (OP Team) Source: © BIMSA

February- March 2014

Support the IED process in the different design phases of tender during 2014 and 2015.
Preliminary design phase (February, March 2014): two meetings (12 and 24/02/2014) with BIMSA, Design Team, energetic expert of Design team and IREC.
Expected during 2014:

- Definitive design (4 month)
- Executive design (5 month) project will be realized during: **2014**
- Construction tender: **end of 2014.**

2015

Expected during 2015:

- Construction works.

3.2.2. Energy performance requirements part introduced in the public tender

Municipality of Barcelona- BIMSA (Barcelona d' Insfraestructures Municipals)

In the framework of the AIDA project, IREC collaborates with **BIMSA- Barcelona d' Infraestructures Municipals** (Municipality of Barcelona) to introduce Integrated Energy Design (IED) in the tender competition: **New equipment in Plaça Sarrià.** Also, IREC assisted BIMSA as they established the nZEB target goals and evaluated these goals, and assisted the design teams to develop and justify their energy strategies as they established their bidding documents.

Finally, IREC provided support for the winning design team and BIMSA, from the beginning of the preliminary design phase, to achieve the nZEB target. Afterwards the winning design team will have support from the IREC team in the Integrated Energy Design (IED) process.

The present document shows the considerations included in the energy requirements in the tender documents, awarding criteria proposed and results of the tender competition.

a) Energy performance requirements in the ideas public tender competition

The specification documents required that each design team elaborate a graphical proposal and energy technical report, which had to explain the energy strategy to achieve the nZEB target, with passive and active solutions and/or energy strategies. These documents were presented in A2 (graphical proposal) and A4 (technical report) format, with plans, sections, façades, renders, schemas, text, etc.

The technical report (sealed bid number 2) had to include (in text format with a maximum of 3 pages), a description, criteria and justification of the proposal related to the sustainability and energy efficiency target.

b) Objective of the tender

The ***Ideas competition tender (harmonized tender)*** organized by BIMSA - Barcelona d' Infraestructures Municipals, Municipality of Barcelona, was conducted to select the design team through a design competition for the **New equipment in Plaça Sarrià,** which contain a Public library, Civic Centre - District Head Office and City archive (total net floor area= 4 640 m²).

c) Organisation of the tender documents

The next points explained the organization of the tender's documents, where different criteria were introduced to achieve the nZEB target:

"Criteris d'intervenció de la nova construcció per l'equipament a Plaça Sarrià (Biblioteca, Arxiu municipal i Seu de districte), al Districte de Sarrià – Sant Gervasi,de Barcelona"- Intervention criteria for new equipment in Sarrià Square (Public library, Civic Center-District Head Office and City archive), In Sarrià - St Gervasi Distrit of Barcelona)

"***Plec de bases. Contractació harmonitzada. Concurs de projectes".*** (Specifications document: Harmonized procurement. Design Competition Tender)

Energy specifications

In the New equipment in Plaça Sarrià tender, the following elments have been introduced in the tender for the new facilities of Plaça Sarrià:

- guidelines for the energy concept (about energy specification requirements),
- clarification of the nZEB definition (energy target),
- procedure and methodology to calculate the energy balance,
- physical boundary of the building (generation on-site),
- integration of the energy generation systems and
- weighting factors.

These issues and definitions were included in the tender prescriptions: "*Criteris d'intervenció de la nova construcció per l'equipament a Plaça Sarrià (Biblioteca, Arxiu municipal i Seu de districte), al Districte de Sarrià – Sant Gervasi,de Barcelona"* (Intervention criteria for the New equipment in Plaça Sarrià - Public library, Civic Center, District Head Office, and City archive); will developed following.

Energy concept: nearly Zero Energy Building (nZEB)

The energy target was established as nearly zero energy building, which should be achieved through an integrated energy design process (IED).

In this sense, BIMSA have decided to incorporate in the tender the following minimum requirements in the tender (Table 5).

Table 5: Summary of the minimum energy performance indexes

Concept	**Minimum requirements**
National/local energy performance classification for buildings:	CTE Energy Certification (mandatory): level A
Primary energy- PE :	Result of PE Balance: <90 kWh/ (m^2·year) (*)
PE % produced by RES:	(*) No specified
CO2 emissions:	No specified
Others:	Limit of Electricity demand: <75-80 kWh/(m^2 year)

(*) The nZEB objective will be realized by Energy balance in PE, using the conversion factors or weighting factors for different energy carriers, where energy demand includes: heating, cooling, domestic hot water - DHW, ventilation, lighting and equipment (affecting by the conversion factors to obtain the final electrical energy). The energy balance is performed on an annual basis, considering the type and efficiency of the energy systems and production of renewable energies systems (RES > 100 kWh /m^2.year).

a) Object of action:

The object of the intervention is the definition of the new equipment construction, which shall include a public library, municipal archive, District Headquarters of Sarrià with an OAC (Citizens Attention Office)

and multipurpose room, according to the functional program included, specifying the technical solutions required for the proper and complete definition of corresponding executive designs. This project should also consider the landscaping of open spaces around the building area of the total intervention, and be capable of adjusting to the existing landscape and the new opening of Menor de Sarrià street.

b) Energy Performance

The building should approach energy self-sufficiency: (where the energy demand of the building can be covered with energy generated by the building or on their surfaces, as far as possible).

In this sense, the grid is an essential help allowing for the export of any excess energy when there is overproduction or providing energy when the building energy generation is insufficent.

The proposals with the greatest potential to reduce energy demand within the building will be highly valued.

The electrical energy consumption must be minimized for the following:

- Lighting.
- Computer hardware
- Pumps and fans
- Lifts
- Any other electronic equipment.

Also, the building proposal should:

- Reduce the total heat demand,
- Be able to save DHW,
- Have efficient heating / cooling systems,
- Provide a Life Cycle Assessment/ Cicle de Vida dels Materials

It will be necessary to make an economic cost evaluation of the proposed solutions and estimate the return time of the initial investment (through the use of renewable energy). Economic evaluations should consider the overall costs according to the methodology established in EN 15459-2007.

Finally, the solutions which incorporate intelligent systems for information technology (2.0) to facilitate the control of consumption by users of the building, will be highly valued. A monitoring system is deemed necessary(measure and record consumption data of each energy vector), and the segmentation by type and consumption of renewable energy systems, therefore theirthe inclusion of a monitoring systems will be consiedered positively.

c) Environmental conditions- Condicions ambientals

Extreme temperatures and humidity must to be avoided, as well as sudden changes in temperature, uncomfortable air currents, unpleasant odours and excessive irradiation; in particular, solar radiation or solar gains through windows, lights or glazed partitions. The enclosed workplaces must achieve the conditions established in the UNE-EN 15251, considering the building as “Category II”.

d) Energy Targets

The proposals should be aimed at creating self-sufficient buildings which are part of the more general definition of nearly Zero Energy Buildings (nZEB,) which are connected to the urban energy infrastructure or grid. The nZEB is a building with design solutions and constructive and efficient technology, in order to reduce the energy demand of the building drastically. In addition, a significant portion of the energy required for the operation of the building is provided by renewable energy systems (RES) located in the same building or in the surroundings.

The following Figure 5 explains the concept of the energy balance of a zero energy building, where the weighted energy exported is equal to the weighted energy imported. If a nZEB building is not fully reached, imported energy will be necessary to compensate the required energy.

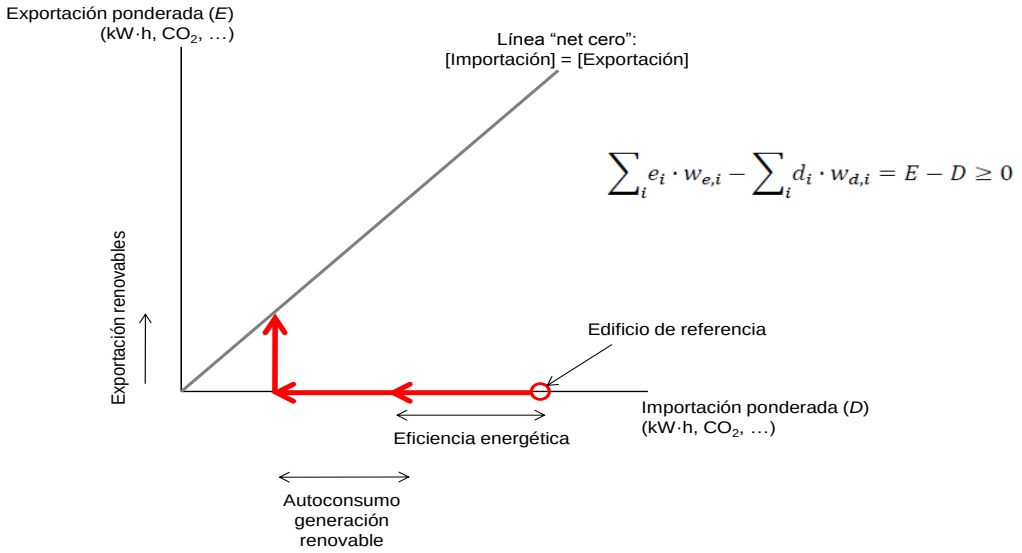


Figure 5: Graphic of energy balance on a zero energy building

The building energy targets are settas measurable objectives, based on the concepts of limiting energy demand, energy balance and energy certification. These objectives will be analyzed and evaluated in different phases of the project as part of the IED - Integrated Energy Design. The Energy targets are summarized in the Table 6.

Table 6: Energy targets included in the tender

Description	Unit	Value	Metrics
Limitation of energy demand	Final electrical energy	75	kW h_e /m^2 year
Energy balance	Primary energy (PE)	-90	kW h_{EP} /m^2 year
Energy Certification	Level or Letter	A	

e) Limitation of energy demand

The justification for this objective will be realized by calculating the energy demand including heating, cooling, domestic hot water -DHW, ventilation, lighting and equipment demands using the following conversion factors (Table 7) to obtain the final electrical energy, regardless of energy system designed.

Table 7: Conversion factors

Energy Use	Conversion factors
Heating and DHW	0.63
Cooling	0.45
Ventilation, Lighting, electric equipments	1.0

f) Energy balance

The energy balance is performed on an annual basis considering the type and efficiency of the energy systems of the building designed, and production of renewable energies (RES). Primary energy will be used for the realization of the energy balance [1]; using the following weighting factors (see Table 8) for different energy carriers.

Table 8: Weighting factors

Energy vector	Weighting factors
Natural Gas	1.07
Electricity	2.28
Biogas	1.00
Biomass	0.25
Thermal solar/ Wind/ PV	0.00

g) Energy certification

Energy certification will be made following the rules and using recognized methods and mandatory or homologated software.

In relation to energy targets the following points will be considered:

- The calculation of the limitation of energy demand and energy balance must consider the climatic data for a typical year.
- The physical boundary to the definition of “on site” and surrounding generation systems is defined in the point “Object of action” of the present document.

Energy awarding criteria

The New equipment in Plaça Sarrià award criteria (with a maximum of 100 points), was included in the Annex 6 of the Specifications document “Global Architectural Quality”, were divided in:

- 80 points for architectural quality, Compliance of Architectural Program, Technical and structural consistency, and maximum costs,
- 20 points for energy efficiency and LCA - Life Cycle Assessment of materials, according to the following detailed points:

a) Technical Proposal: Global Architectural Quality from 0 to 100 points

Compose bof sub items:

- **Architectural quality.....** from 0 to 40 points
- **Compliance of Architectural Program.....** from 0 to 10 points
- **Energy efficiency and LCA of materials.....** from 0 to 20 points

Also, the proposals will be highly valued if they present the best technical and economical solutions so that the building:

- tends towards self-sufficiency (energy),
- reduces the energy demand,
- incorporates intelligent systems (load control by users).

Furthermore, the proposals will be highly valued if they present the best technical and economical solutions for the reduction of the ecological foot print.

- **Technical and structural consistency .....**from 0 to 20 points
- **Maximum costs.....**from 0 to 10 points

3.2.3. Results of energy criteria evaluation

Contract awarding process (evaluation of proposals)

IREC collaborated with BIMSA as a part of the jury to support them at assigning the scores in the energy efficiency sections, to evaluate the submissions in terms of nZEB requirements (supporting the contract awarding for the preliminary design phase: *Serveis de redacció del projecte de la nova construcció per a l'equipament a la Pl. Sarrià -Biblioteca, Arxiu municipal i Seu del districte- al districte de Sarrià - Sant Gervasi)*.

Four sessions were held in October and November 2013:

- 1st Jury meeting: The jury evaluated 26 of the 58 proposals which have been presented in detail. The principal argument used was the architectonic quality (architectonic language, relationship between the plaza and the neighbourhood, and program and functional definition etc.)
- 2nd jury meeting: The jury evaluated another 26 proposals with the same criteria in detail.
- 3rd jury meeting: The jury discussed in detail the remaining 6 proposals. The principal arguments to prepare a draft of the final scoring were, among others, architectonic quality and energy efficiency. BIMSA and IREC discussed the criteria in detail to assign the final score on energy efficiency with the jury. The 58 proposals presented were reviewed to assign the detailed scoring on energy efficiency.
- 4th jury meeting. The jury assigned the 1st, 2nd and 3rd places as well as the ranking list including the other 55 participants. The winner design team is OP TEAM ARQUITECTURA, SLP (submission name EULALIA).

The energy criteria, the awarding points and the characteristics analysed in the proposals will be described and summarized in the following points.

Requirement of the energy expert in the design team

The energy and sustainability expert requirement was included in the tender documents, in clause 9 of the specifications document: harmonized procurement, design competition tender.

The requirements established are:

- The accreditation of a sound technical background of the design team is required and the collaboration of the energy efficiency and sustainability expert in the design team, among others. This professional must certify experience of at least five (5) years and has to provide a CV.
- Letter of commitment of collaboration of the energy efficiency and sustainability expert (pp. 14).

Results of the tender competition

There were fifty-eight (58) participants. All proposals, except very few ones, explained their passive architectural strategies, combined with active solutions and in some cases with RES generation. The

proposals consist of a written technical report and a graphical design proposal (sketches, drawings, schemes, figures, etc).

Achievement of nZEB criteria.

The total score including the energy efficiency and LCA of materials was 20 points maximum (see above). A maximum of 13-15 points can be awarded for the energy efficiency criterion. For the assignment of the energy efficiency scoring, the jury evaluated the proposals taking into account the energy efficiency target (see the Table 5):

Table 5: Energy efficiency target (awarding points)

Energy efficiency target	**13-15 points maximum)**
a) the self-sufficiency (energy)	X
b) the reducing the energy demand	X
c) the buildings that incorporate intelligent systems (load control by users)	X
Sketches and drawings supporting the energy concept.	X
Total points	**100**
Percentage of the total score	**13-15 %**

To evaluate the 'Energy Efficiency' criteria, and verify if the objective was met by the participants proposal, the proposals were analysed from different energy performance categories, based on the analysis realized in Spain for existing building [2]. The parameters were organized in: a) *Building configuration (Fig. 2);* b) *Lighting and HVAC systems (Fig.3) and* c) *Renewable energy systems generation (Fig. 4), d) Energy certification (Fig.5).*

a) Building configuration

a.1 Shape

Building form and intermediate spaces strategies (compactness, façade differentation, Atrium- covered courtyard, skylights, patio-courtyard, sunspace-wintergarden)

a.2. Passive strategies

- Configuration of different passive strategies (natural ventilation, solar thermal, solar protections –fixed, daylighting,
- Thermal and physical characteristics of the envelope (U values, thermal inertia - mass, thermal high insulation)
- Solar Protection (includeing in the façade and roof elements).

- Natural ventilation strategies (selective and night ventilation, cross ventilation if applicable)
- Daylight optimization strategies (special glazing specifications, patios, skylights, atriums, light shelves, treatment of the façade by orientation, solar and glare protection in daylight conditions).

a.3. Envelope

Roof and façade systems.

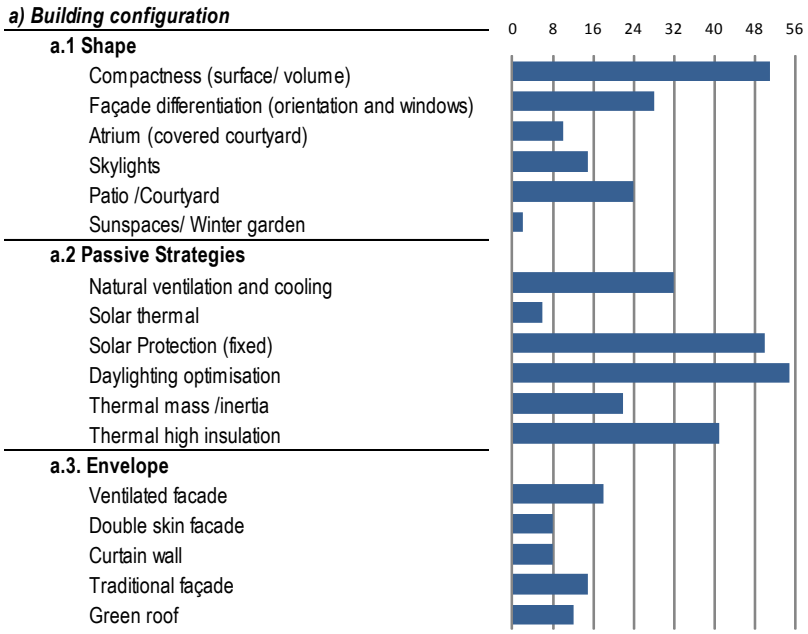


Figure 6: Analysis of building configuration of the proposals

b) Lighting and HVAC systems

b.1.Lighting

Lighting and daylight systems (zoning, sensors and photo-sensor, dimming to regulate artificial lighting, glare protection in daylight conditions, LED technology)

b.2. Air ventilation system

Terminal units according to the systems (displacement, low temperature, radiant floors, etc.)

b.3. Dynamic solar protection

Operation of dynamic systems (manual, automatic)

b.4. Heat/ cold production

Heat and cooling systems (non renewable energy: electrical, gas)

Specification of boilers and heat pumps (cogeneration, district heating/cooling, bio- fuel).

b.5. Monitoring system

Specification of building management, control and monitoring systems.

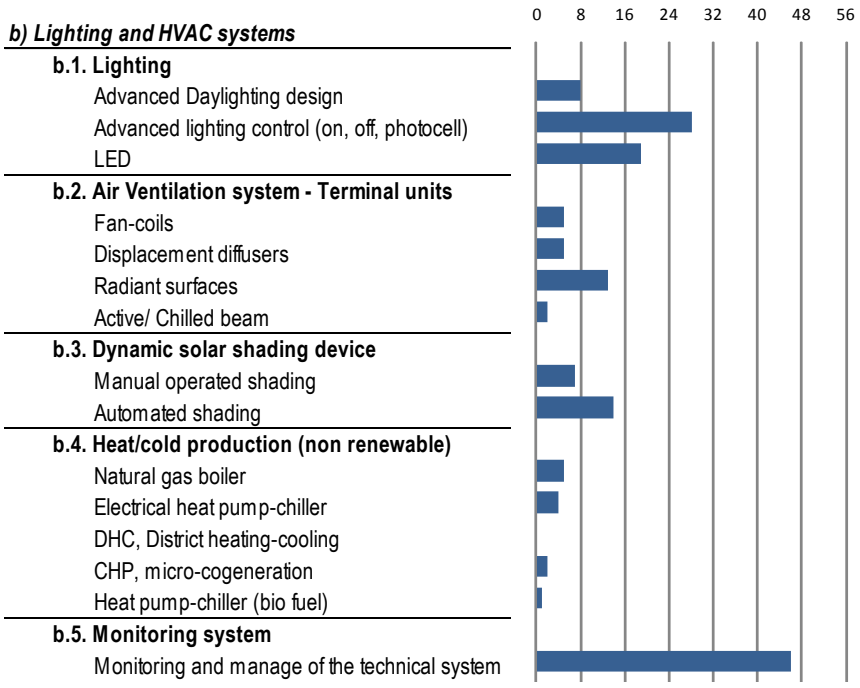


Figure 7: Analysis of the lighting and HVAC systems of the proposals

c) Renewable energy systems generation

- Architectural integration of RES (roof, façade) or no integration.
- Energy generation systems (electricity, thermal- domestic hot water)
- Electricity generation by RES (Photovoltaics, wind turbine, co-generation)
- Thermal energy generation by RES (solar collector, geothermal, solar absorption machine, biomass)

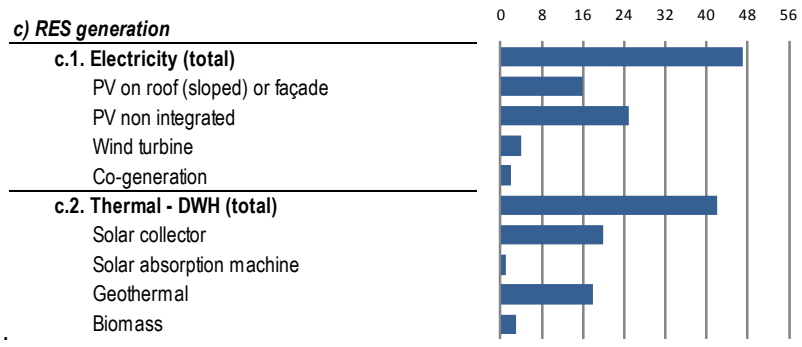


Figure 8: Analysis of RES generation of the proposals results.

d) Energy certification

- Commitment to use specific energy certification and simulation tools for the next design phases: evaluation of the energy balance during all the design phases (preliminary, definitive and executive), and energy certification or energy labelling (CTE, LEED, BREAM, or not specified).

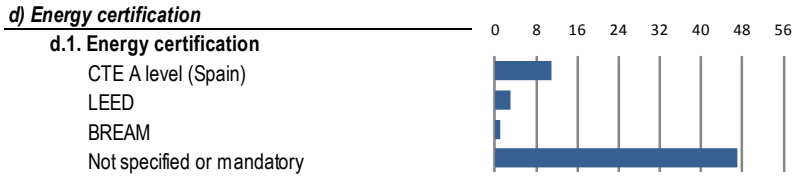


Figure 9: Analysis of the energy balance aspects of the proposals

Finally, the point's assignment ranking of the 58 proposals presented (all items evaluated) shown in the Table 10 and **Error! Reference source not found.**, which detailing the submission number, submission name and total points assigned to the technical proposal:

Table 9: Result of point's assignment ranking of the 58 proposals presented (Part I)

nº oferta	Licitador	OFERTA TÈCNICA max. 100 punts
14	EULÀLIA	91,00
8	PASSATGE SARRIANENC	85,00
6	KTRU	75,00
1	CINC PETXINES	73,00
37	FER DE LA NECESSITAT VIRTUT	71,00
39	LAVISIVAL	70,00
21	EL SALÓ DE SARRIÀ	70,00
54	LA PLAÇA DELS PRODIGIS	68,75
46	SARRIÀMIC	67,00
24	PATIS ENCREUATS	66,00
15	ESCLETXA	65,50
35	TEIXITS ADAPTABLES	64,00
12	WELCOME	64,00
28	RE+SO+NÀNCIES	62,50
38	BSA	62,00
2	A BIG HUG	62,00
52	GE(r)OMANCIA	61,00
36	ENCAIX	61,00
57	MEDITERRÀNIA	61,00
18	L'ESGLÈSIA, LA PLAÇA I EL PATI	60,50
13	NÚVOL	60,00
47	ANGELINA	60,00
27	AIRRAS	60,00
58	NAVALLA SUÏSSA	60,00
30	EL COR DE LA CIUTAT	59,00
49	MOBY DICK	59,00
31	SAB	59,00

Table 10: Result of point's assignment ranking of the 58 proposals presented (Part II)

33	PLAÇADOS	58,00
9	PELS QUI US ACABEU DE LLEVAR SAPIGUEU QUE	58,00
20	ESPAI PÚBLIC	58,00
4	LOLA	57,00
51	MOTS	56,00
56	COM IGUALS	56,00
48	CALIGRAMA	56,00
40	FEM PLAÇA	56,00
17	EL PATI DE LA SARDANA	55,50
10	TOULOUSE	55,00
16	MATELAI	54,00
3	KARELIA	54,00
32	P S 3	54,00
5	BANDA MUNICIPAL	53,00
41	DE LA SEU	53,00
23	LA PORTA	53,00
7	OVO	53,00
11	DAB-3	52,00
25	VERS EL CAP DE LA VILA	52,00
19	ATRI	51,75
55	DOS PATIS	51,00
53	MANTÈ-KO	50,75
43	PAS DE DEUX	49,00
45	RUBAIYAT	49,00
29	VET AQUÍ	47,00
34	VENTS, TORRENTS, TORRES I CONVENTS	47,00
26	SARRIÀ... 3 EN 1	46,00
44	EL BAR DE LA PLAÇA	46,00
22	FORUM	44,00
42	RESET	39,00
50	KM 0	36,00

Implement and support the IED process

Concluding the ideas design tender, IREC is supporting BIMSA and the winning design team and monitoring the IED process in the preliminary and basic design phases.

Project meetings have been held in the preliminary design phases, (with IREC, the municipality technicians: BIMSA and Sarrià- St Gervasi District, the OP Team architects and the energy expert engineer) to support the development of energy strategies in the preliminary design phase to achieve the nZEB target. The design phase is for now paused, and awaitig the fonctional programme (occupier uses).

IREC will support and monitor the next phases, the basic and executive design, during the framework of AIDA project.

Partial results and conclusions: nZEB in municipal practice

Partial results and conclusions of experiences in competitive tendering to achieve nZEB targets in Merano (EURAC) and Barcelona (IREC) Municipalities resulted in a published scientific paper at the World Congress on Sustainable Building 2014 - WSB14 in Barcelona, Spain: "***Evaluation of the energy performance strategies in competition tenders to achieve Nearly Zero Energy Buildings: two case studies in Barcelona and Merano***."

In particular, this paper shows the approach used during the evaluation of proposals in submission phase, from the analysis of the design solutions presented to achieve the energy target and the energy performance (demand and generation on site), as well the scoreing(energy efficiency item). Among others conclusions, this work highlights the importance of the definition of tender and specification documents related to the Energy efficiency, from the early stages of the architectural design, to achieve a nZEB and integrated the IED process.

References

[1] IEA SHC Task 40 / ECBCS Annex 52: Towards Net Zero Energy Solar Buildings. Available: http://www.iea-shc.org/task40/index.html.

[2] Sanchez, A., Salom, J., Cubí, E. (2012). *Towards net zero energy office buildings in Spain: a review of 12 case studies*. EuroSun 2012 (ID 116), Rijeka, Croatia, 18-20 September 2012.

[3] Gonzalez Matterson, M. L; Paoletti, G., Salom, J. (2014) *Evaluation of the energy performance strategies in competition tenders to achieve Nearly Zero Energy Buildings: two case studies in Barcelona and Merano.* Word Sustainable Building Congress -WSB14, Session S101: pp.8-14. Barcelona, Spain, 28-30 October 2014.

4. Lessons Learnt

In our experience municipalities do not have the capacity to achieve the nZEB target on their own, and have difficulty with the idea of changing their traditional approaches, because they consider new approaches complicated to manage and, as any other change, perceived as risky in comparison with well known procedures. Starting from this statement it can be concluded that the Municipalities are motivated and interested in realizing nZEBs and to use an IED process only if they receive third party support from a capable partner that is able to manage this innovative concept (nZEB) and procedure (IED). This support must start from the buildings first concept and ending once the building has been fully operative for a meaningful period.

The first step is to convince the relevant members of the local public administration (mayor, deputy mayor, technicians etc), from early phases of the collaboration, of the many benefits of using an integrated energy design process and pursuing nZEB targets for new or existing buildings. It requires presenting to them the opportunities and advantages of these ideas, such as a high level of final building quality and indoor environmental quality, in addition to the reduced energy consumption and operational costs.

From the early phases of the collaboration, it is necessary to define the final goals that must be achieved. All stakeholders (design team, owner, building constructor…) involved in the project have to accept and share these goals. In this way the project starts off with a general positive attitude, thus the level of cooperation between the various parties can be expected to be more effective than average when it is reduced to simple communications or sharing of material with each other later on. A good management of the IED process consists of the organization of meetings to present and discuss different topics. This process guarantees the opportunity to define the best solution from a wide range of possibilities. To facilitate the management of the IED process it is necessary to identify a responsible person (the facilitator) who manages the process, organizes the meetings and maintains the multi-disciplinary nature of the working team. In some cases it happens that the facilitator becomes an added issue to the administrative, legislative and economic procedures that the contracting authority already have. One of the innovations of the IED process, that is still evolving, is to increase the efforts during the design phases and to reduce them in the construction phase. ‘Increasing the efforts’ means to lengthen the design timeframe, increase the number of meetings between stakeholders, and hence the design process management costs. It may appear at first to be more expensive than a standard design procedure, but overall it reduces the number and the cost of unforeseen or last minute deviations from the original plan during the construction

phase. These deviations are part of the conventional procedures, generating significant extra costs.

Within the AIDA project we developed a strategy in which we are able to define and monitor the final energy target of the building during the design tendering phases. We achieved this by introducing in the tender documentation a well-defined methodology for the energy balance calculations that are completed by various simulation tools which have to be used by the members of the design team to analyse the energy performance of the proposed building and the production from RES.

We proposed to use national/local tools used for the EPC and aiming to achieve the highest energy class of national codes, and to calculate the energy balance by the 'Net ZEB evaluation tool' elaborated by Task 40 – ECBCS Annex 52[11].

In some procedures, it is possible (and highly advised) to invite an expert who is specialized in building energy efficiency, RES and Energy Performance Certificates (EPC) into the design team. In some countries this 'professional' can be associated with the local energy efficiency certifiers, who are able to use tools for energy simulation and methods for energy balance calculations. The technical competence and experience on steady-state in dynamic simulation tools must be demonstrated by describing the previous completed works as references, explaining the used tools, the results obtained and the different performance assessment actions (blower door test, thermography, etc.) which were carried out.

It is also necessary that within the evaluation panel there is an expert specialized in nZEB, building energy efficiency and RES who is able to check the energy performance results obtained by the design team members.

In order to stimulate and motivate the design teams to reach the nZEB targets, the contracting authority should define, in the financial planning together with the other usual costs (Architectural, static, electric, hydraulic, etc.), a specific budget to cover the development of the building as an energy system (in other words "the energy strategy"), the assessment of the actual energy performances, and the energy balance. The contracting authority can also allocate a monetary bonus for the building constructor (and/or design team), that becomes

[11] Source: IEA SHC Task 40 – ECBCS Annex 52:Towards Net Zero Energy Solar Buildings (http://task40.iea-shc.org/net-zeb)

available after two years of continuous monitoring of the building energy consumption if the energy balance is nearly zero.

Open tendering procedures have the advantage of having a high number of submitted proposals and relative solutions. Restricted procedures on the other hand can be easily managed and supported with an IED approach.

5. Conclusion

The municipal technicians' lack of knowledge about nZEB and , together with the economic restrictions and long timing of public procedures, are considered as the main reasons for the limited number of nZEBs realizations, despite the fact that nZEB will soon become compulsory in municipalities.

The goal of the AIDA project was to react against this lack, supporting municipalities and design teams to adopt the IED process and to develop an energy strategy plan for the building from the early design stages.

The municipalities are usually very interested in energy consultancy and support regarding integrated energy design and nZEB, but country-specific conditions may often influence the tender process and the cooperation between municipalities and nZEB experts (e.g. the role of administrations and managers assigned for each public procedure). In general, the support offered to the municipalities allowed us to develop an IED process and a continuous assessment of the design proposal by different points of view (energy efficiency, aesthetics, costs, tenant's needs…). Therefore, the final quality achieved by design proposals was higher than in a traditional process; indeed, during the project design it was possible to discuss different aspects and to define the best solutions. Another advantage of this action was the achievement of the performance targets defined at the beginning of the collaboration and included as mandatory requirements in public tender (e.g. nearly zero or zero energy balance, high level of indoor comfort, economy, functionality, aesthetic impact, etc.).

During the methodology development for the introduction of energy performance requirements and IED process in public tender we were faced with a large number of different available tender typologies. Each procedure has different aims from the design proposal to the construction building to the definition of the design team, or many of these. For this reason in each tender procedure different approach is needed to included performance targets. This means that there is no 'unique' methodology of nZBE target integration, but that work methodologies change in relation with the chosen administrative procedure.

Unfortunately, some collaborations opened in the AIDA framework were closed with the project, but before the public design tender issuing, for different reasons, such as:

- timing of the public administrative process, often longer and slower than the (only) three years of the AIDA project;
- election periods that delays or suspend the administrative procedures et decision processes;
- difficulty to find available case studies already included in a planning list of the 'necessary' further public investments, with a feasibility study already done, completed by an economic estimation;
- economic crisis that has reduced public investment in public buildings, limiting the number of public design tenders. In some cases, the public efforts are restricted to a definition of partial solutions in order to keep the costs low.

Collaborations, although not concluded with the issue of tender documents, were positive and successful in case financing should become available, the preliminary results can be used as a starting point for future tenders and definition of specific requirements. Furthermore, the municipality representatives had the chance to improve their technical knowledge on IED process, nZBE and life cycle cost calculations. This ground preparation could be exploited in future public building design or construction tenders.