AFFIRMATIVE INTEGRATED ENERGY DESIGN ACTION

AIDA

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D4.1 Report of the actions carried out to engage municipalities

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1. INTRODUCTION

This report aims at summarising and quantifying the actions made to the development of actions to promote nearly zero-energy buildings (nZEBs) in the municipal energy roadmaps or in the Sustainable Action Plans (SEAPs).

This report explains the methodology followed by the partners to get in contact with the municipalities, to explain them the possibilities of collaboration with AIDA.

2. METHODOLOGY FOLLOWED TO PROMOTE nZEBs IN SEAPs

2.1 Background on Sustainable Energy Action Plans (SEAP)

A SEAP is the key document in which the Covenant signatory outlines how it intends to reach its CO_2 reduction target by 2020. It defines the activities and measures set up to achieve the targets, together with time frames and assigned responsibilities.

Covenant signatories are free to choose the format of their SEAP, as long as it is in line with the general principles set out in the Covenant SEAP guidelines.

There is a template of a SEAP which constitutes the basic guide to be followed by the municipalities interested in submitting a SEAP (http://www.eumayors.eu/support/library_en.html). Within this template, two basic sections are considered:

1. Baseline Emission Inventory.

   This section aims at defining the inventory year when the CO_2 emissions of all the sectors are computed. It constitutes the initial situation.

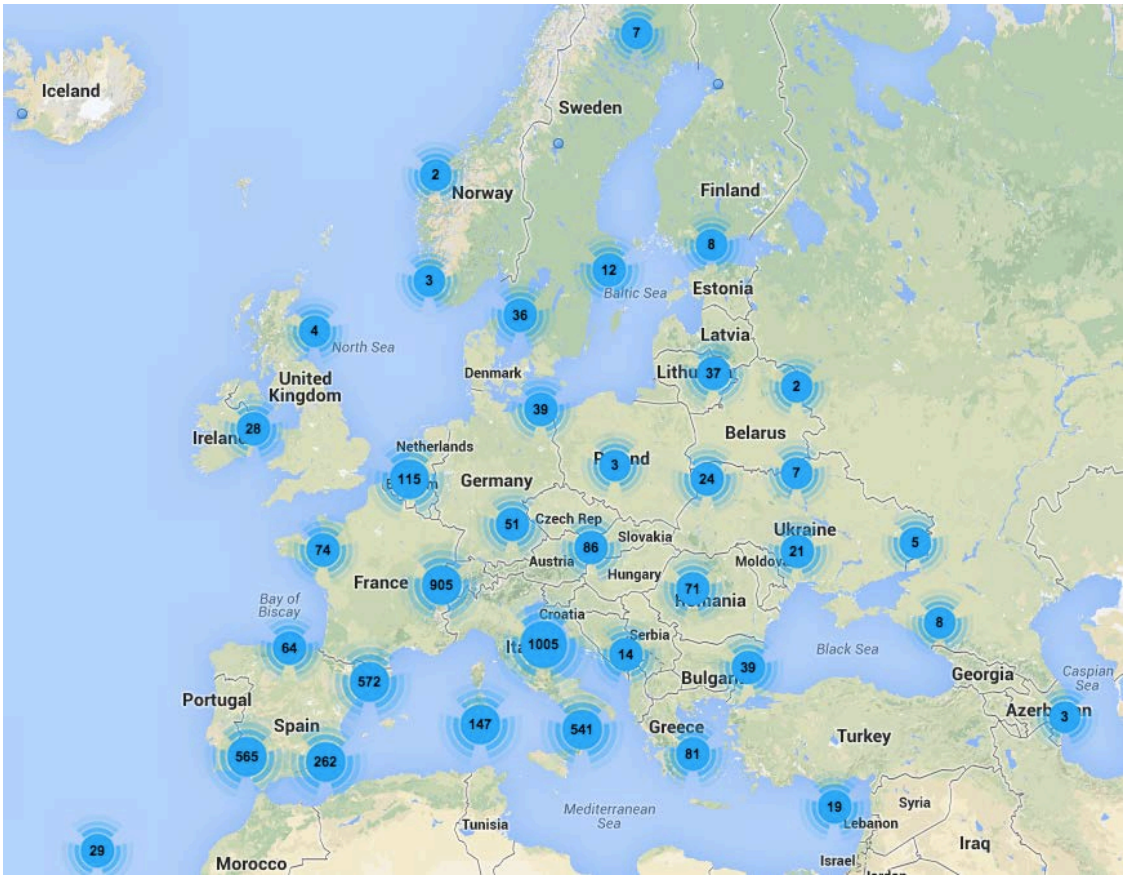
2. Sustainable Action Plan.

   This section defines the actions to be carried out to achieve the 2020 energy savings and RES production goals. Each measure or action should be described in detail and the economic costs as well as the corresponding energy savings must be calculated.

2.2 Countries involved in SEAP context

Signatories represent cities that vary in size from small villages to major metropolitan areas such as London or Paris. Within a year following their signature, Covenant signatories commit to implement SEAPs on their territory, with the aim of reducing CO_2 emissions by at least 20% by 2020.

4936 signatories was the number signed up the 22nd of October of 2013 (last viewed on Covenant of Mayors website). Through the picture below, you can notice that most of signatures are comprised between the Mediterranean countries Italy and Spain, which represents around 80% of the overall signed SEAPs.



After checking each AIDA partner within the SEAP context adoption, this methodology will be applied depending on each case. Relating to the partners, the number of SEAPs (signed and submitted) is listed by the next table:

AIDA partner	Country	Latest number of signatories by country (22th October 2013)	Latest number of SEAP submitted by country (22th October 2013)
CIMNE	Spain, ES	1434	903
EURAC	Italy, IT	2523	1607
CRES	Greece, GR	85	49
GEONARDO	Hungary, HU	21	16
TU Wien, AEE INTEC	Austria	11	8
HESPUL	France	113	68
Greenspace Live	United Kingdom	33	26

2.3 Description of the methodology

2.3.1 Engagement of Municipalities

a) First contacts and sent of SEAP's layout

CIMNE distributed the following documents among the partners to help them to engage municipalities:

- SEAP layout: This document gave a detailed explanation on how the actions to promote nZEB should be included in municipal Sustainable Energy Action Plans (SEAP).
- Building model template: This document provided a template for a building description.

b) Follow up and face to face meeting.

Further, signatures of commitment to promote nZEB actions within SEAPs by municipalities are already included in the AIDA report "Signed agreements showing commitment of municipalities."

2.3.2 Performing of pilot tests in Spain as a reference

This project is focused on the promotion of nZEBs in the sector of **public buildings**. These public buildings can be of new construction or retrofitted buildings. Therefore, municipal authorities are the main actors of these activities.

This project proposes to make an implementation guide to identify nZEB possibilities and promote this type of buildings within SEAPs. Following this, it was proposed to use the Spanish municipalities as pilot tests for developing a guide which will define some rules towards nZEB promotion. These pilot municipalities are listed at the table below:

Type of nZEB action	**Municipalities involved as pilot test**	**Result**
New nZEB proposal	Municipality of Murcia	Definition of an nZEB action for a new public building
Retrofitting nZEB proposal	Municipality of Torroella de Montgrí, Municipality of Ordis, Municipality of Gualta	Definition of a nZEB action for the refurbishment of an existing public building
Possible New / Retrofitting nZEB proposals	Diputació de Girona (public body)	Onwards, getting other municipalities involved

2.3.3 Definition of the implementation guide for including actions to promote nZEB within SEAP

With the gained experience of the Spanish municipalities, an implementation guide is defined in order to have a point of reference and get involved more municipalities in line with the promotion of nZEBs.

The implementation guide had to make the effort of becoming a practical tool and to achieved the requirements and constrains of the SEAPs, basically related to the need of define the expected CO2 reduction and the economic payback period of each action. These requirements forced us to propose a definition of nZEBs within the context of SEAPs and a criteria to evaluate whether a new/retrofitted building was in line with the nZEB concept or not. The criteria defined are based on prior experience that involves this type of buildings and intends to achieve real requirements in the way of nZEBs.

Another issue which was faced in the implementation guide concerns to the selection of the software tools able to perform the energy calculations. These software tools must be completely free licence or open-source platform based.

In the Annex I one of this deliverable it can be found the last version of the implementation guide briefly introduced above.

2.3.4 Wide spread dissemination of the implementation guide

Different activities have been organized to disseminate the implementation guide among the partner countries:

Title and type of Activity	Place and date of Activity	Partner/s involved
Seminari "Reforç i innovació de les accions previstes als PAES", Workshop	Girona (Spain), 16.09.2013	CIMNE
Energy Effiency and renewable energy in public buildings in CEE Countries, Workshop	Prishtina (Kosovo), 19.09.2013	GEONARDO, TU WIEN, CIMNE
Conference: Objective NZEB for the transformation of the building stock, Workshop	Bolzano (Italy), 20.09.2013	EURAC, CIMNE
Adaptation of the Guide to other countries with SEAPs	Onwards	CIMNE, EURAC, CRES, GEONARDO, AEE INTEC, HESPUL, GREENSPACE

2.4 Summary of the actions carried out to promote nZEB in SEAPs in each country

The following table shows a summary of the actions carried out by the partners to engage municipalities and to promote the implementation of nZEB actions within the SEAPs:

Municipality	Country	Actions carried out to engage the institution	Outcomes
	ES		
Torroella de Montgrí	ES	- 3 phone call, - 5 mail, - 1 presentation meeting	- 1 SEAP agreement related to include 1 retrofitting nZEB proposal of an office building.
Gualta	ES	- 2 phone call, - 2 mail, - 1 presentation meeting	- 1 SEAP agreement related to include 1 retrofitting nZEB proposal of a multi-purpose building.
Ordis	ES	- 2 phone call, - 2 mail, - 1 presentation meeting	- 1 SEAP agreement related to include 1 retrofitting nZEB proposal of a multi-purpose building.
Girona (public body)	ES	- 20 phone call, - 24 mail, - 2 presentation meeting	- 1 SEAP agreement related to develop a general methodology to include SEAP actions to promote nZEBs in other municipalities of Girona.
Murcia	ES	- 13 phone call, - 18 mail	- 1 SEAP agreement related to include 1 new nZEB proposal of an office building.
	IT		
Merano	IT	- 12 phone calls, - 10 mails, - 6 presential meetings	- 1 SEAP agreement related to include 1 new nZEB proposal of a primary school
Berssanone	IT	- 3 phone calls, - 8 mails, - 2 presential meetings	- 1 SEAP agreement related to include 1 new nZEB proposal of a geman music school
Bolzano	IT	- 3 phone calls,	- 1 SEAP agreement related to include 1 new nZEB proposal of an

		- 8 mails, - 3 presential meetings	apartment building for elderly people
	GR		
Thessaloniki	GR	Several e-mails (3 related to AIDA) 1 meeting	1 SEAP agreement related to include 2 retrofitting proposals in two school building complexes. Retrofitting proposals included in SEAP to be submitted shortly.
Ambelokipi-Menemeni	GR	No information	- 1 SEAP agreement related to include 1 retrofitting nZEB retrofitting proposal of an old militar building.
	HU		
Gödöllő	HU	- 3 phone calls, - 4 mails, - 3 presential meetings	- Gödöllő is not a member to the CoM, so no SEAP is mandatory. The latest news include: The swimming pool is no longer subject of such actions, most of the planning has been carried out, building will start mid-2014. Instead there is the retrofitting of a local elementary school (within the next 3-4 years), and also the second stage of retrofitting at the House of Arts (within 1-2 years time) Both could benefit from the actions offered by AIDA.
	AT		
Gleisdorf	AT	- 4 phone calls - 5 mails - 6 personal meetings	- 1 SEAP agreement to include 1 new nZEB proposal of a future building, which is not decided yet

3. METHODOLOGY FOLLOWED TO PROMOTE nZEB IN ALTERNATIVE MUNICIPAL ROADMAPS

3.1 Background on alternative roadmaps

3.1.1 Austria: Alternative programmes of Austrian / other European municipalities including similar plans as SEAP

e5-Gemeinden (e5-communities):

e5 is a certification and quality management system for communities. These are making a significant contribution to a sustainable future by improving energy efficiency and increasing the utilisation of renewable energies. Communities/municipalities are forced to reach six different main targets subdivided in 84 measures ("e5-catalogue") regarding climate protection and sustainability by signing an agreement with the regional e5-programme organization. The programme's audit and certification system was the basis for the later developed European Energy Award which is a part of Covenant of Mayors' initiative:

http://www.european-energy-award.org

The European Energy Award® is a programme for planning and realizing energy and climate protection policy goals and measures in municipalities.

By the end of 2013, around 140 municipalities in Austria are member of the e5 campaign. For example the municipality of Weiz, also involved in AIDA, is "e5-Gemeinde" with currently four "e"s.

Klima- und Energiemodellregionen (Climate and Energy Model Regions):

Communities/Municipalities or local organisations of municipalities can declare themselves as „Climate and Energy Model Region" and then are subsidised by the Austrian Climate and Energy Fund of the Austrian Federal Government. For example the in AIDA-project, involved municipality of Hartberg is such a region – find more on: http://www.klimaundenergiemodellregionen.at/start.asp?ID=242792.

They developed an energy plan 1998, a concept for a CO2-neutral municipality and different other activities in the frame of "Klima- and Energiemodellregion" – there is a report of measures planned available at:

http://www.klimaundenergiemodellregionen.at/images/doku/hartberg_umsetzungskonzept_endbericht.pdf.

The main energy targets of the region of Hartberg are to obtain more than the EU 20/20/20 targets. The aim of the municipality of Hartberg itself is that 99% of all heat and electricity consumption of the public owned buildings should come from RES by 2014.

Klimabündnisgemeinden (Municipalities in Climate Alliance):

The members of the Climate Alliance commit themselves to reduce their greenhouse gas emissions continuously. The aim is to cut CO_2 emissions by 10 % every 5 years. The important milestone of halving per capita emissions (baseline year 1990) shall be achieved at the latest in 2030.

In the long-term, Climate Alliance members aim at a sustainable level of 2,5 tons CO2 equivalent emissions per capita and year by energy saving, energy efficiency and the use of renewable energy sources. Reaching these goals, however, requires concerted efforts by all decision-making levels (EU, national states, regional/province governments, municipalities), as they cannot be achieved by measures taken by municipalities alone. In order to document their efforts undertaken, Climate Alliance members must draw up a report regularly.

Every municipality makes its own “climate-protection plan” to reach these targets. For example the energy targets until 2015 in the „Climate Alliance“-municipality of Gleisdorf, which is involved in the AIDA-project, are to fulfil 25% of heating consumption and 100% of the electricity consumption should be generated by RES.

All of these “municipality-roadmaps” have no specific requirements saying anything about limits for primary energy or CO_2-emissions on the building level beside the Austrian legal ones. But they all follow a comprehensive plan reducing CO_2 and energy consumption, which exceeds the EU 20/20/20 targets

3.1.2 France: Alternative programmes of France / other European municipalities including similar plans as SEAP

The Grenelle 2 Law, adopted in February 2009 states that

"The role of public authorities in the design and implementation of sustainable development programs should be strengthened. To this end, the State will encourage regions, departments and communes and joint authority groups of more than 50,000 inhabitants to establish, territorial climate-energy plans (PCET) consistent with planning documents before 2012."

These PCET have 2 goals: reduction of greenhouse gas emissions by a factor of 4 (divide by 4) by 2050 and reducing vulnerability by adapting to climate change

To reach the Factor of 4 in 2050, an intermediary goal of 3x20 by 2020 translates to a reduction of 17% in Greenhouse gas emissions, 20% reduction in energy demand and a contribution of 23% renewables in final energy consumption.

Starting in 2010 Hespul has worked with 3 joint local authorities and 1 commune with 40 000 inhabitants to develop voluntary territorial climate-energy plans. The first step was to engage the public authorities in a greenhouse gas emissions audit and then in the establishment of an action plan to reduce these emissions.

Nationally, buildings are responsible for 25% of all Greenhouse gas emissions and 45% of energy consumption. These proportions are consistent with emissions and consumption in the authorities locally.

These authorities have engaged in an innovative process of renovation and construction applied to their infrastructures so that they can meet the goals of their territorial climate-energy plans. These authorities also looked at ways of encouraging private building owners to join them in working towards the territorial climate-energy plans goals.

The PCET process exists within an established framework in France which is why it is the preferred tool (over Covenant of Mayors, for example)

3.1.3 UK: Alternative programmes of United Kingdom / other European municipalities including similar plans as SEAP

No information for the moment.

3.2 Countries involved in Alternative Roadmap context

AIDA partner	Country	Alternative roadmap	Latest number of alternative roadmap submitted by country and Date of Updating (22 November 2013)
AEE INTEC	Austria, AT	e5-communities	more than 140 (also municipality of Weiz)
AEE INTEC	Austria, AT	Climate and Energy Model Regions	106 (also municipality of Hartberg)
AEE INTEC	Austria, AT	Municipalities in Climate Alliance	953 (also municipalities of Weiz, Hartberg and Gleisdorf)
HESPUL	France, FR	PCET	No information
GREENSPACE	United Kingdom, UK	No information	No information

3.3 Description of the methodology

3.3.1 Engagement of municipalities

a) First contacts and sent of municipal roadmap's layout

CIMNE distributed the following documents among the partners to help them to engage municipalities:

- Roadmap layout: This document gave a detailed explanation on how the actions to promote nZEB should be included in local energy roadmaps.
- Building model template: This document provided a template for a building description.

b) Follow up and face to face meeting.

Signatures of commitment to promote nZEB actions within municipal roadmaps by municipalities are already included in the AIDA report "Signed agreements showing commitment of municipalities."

3.3.2 Adaptation of the implementation Guide for including actions to promote nZEB to their municipal roadmap

At present, the involved partners just started the adaptation of the implementation guide to the specific requirements of each alternative roadmap

3.3.2.1 Austria: Alternative roadmaps selected to be implemented as a Guide

For the remaining period of the AIDA project it is the goal to implement the nZEB guide of AIDA in the energy plan of the municipality of Hartberg in the frame of “Klima- und Energiemodellregion” (Climate and Energy Model Regions). This energy plan was developed in 1998 and the main energy targets of the region of Hartberg are to obtain more than the EU 20/20/20 targets. The aim of the municipality itself is that 99% of all heat and electricity consumption of the public owned buildings should come from RES.

Detailed talks will start soon and thereby it will be discussed if the action will include the definition of limit values for new municipal buildings or the renovation of existing municipal buildings.

3.3.2.2 France: Alternative roadmaps selected to be implemented as a Guide

The local authorities involved in the AIDA project have already engaged in PCET, to ensure the most coherent approach, it has been decided to remain in this framework.

3.3.2.3 UK: Alternative roadmaps selected to be implemented as a Guide

No information for the moment.

3.3.3 Wide spread dissemination

Once the adaptation of the guide is finished, a wide spread dissemination will be carried out.

3.4 Summary of the actions carried out in each country to promote nZEB within alternative roadmaps

Municipality	Country	Actions carried out to engage the institution	Outcomes
	AT		
Hartberg	AT	- 2 phone calls, - 2 mails, - 1 personal meeting	- 1 municipal roadmap agreement to include 1 new nZEB proposal of a future building which is not decided yet
	FR		
No information	FR	No information	No information
	UK		
COSLA (Convention of Scottish Local Authourities)	UK	Mails	COSLA to promote AIDA colaboration

4. SELECTED BUILDINGS TO BE INCLUDED IN ACTIONS TO PROMOTE nZEB WITHIN MUNICIPAL ROADMAPS

4.1 Spain

4.1.1 Public body: Torroella de Montgrí municipality

SEAP or alternative roadmap: SEAP

<table>
<tr><td colspan="4">Building 1: Arxiu i Serveis Municipals Can Mach</td></tr>
<tr><td rowspan="2">Type of nZEB action</td><td>New building</td><td>Partial retrofitting</td><td>Full retrofitting</td></tr>
<tr><td>----</td><td>X</td><td>----</td></tr>
<tr><td>Brief building description</td><td>Typology</td><td>Usability</td><td>Construction year</td></tr>
<tr><td> 
</td><td>Public</td><td>Offices</td><td>2011</td></tr>
<tr><td>Status</td><td colspan="3">It is an office building giving administrative services for the citizens. It is a 3 floor-plant building, but only 2 floors are operational.</td></tr>
<tr><td>Other considerations</td><td colspan="3">Because it was constructed in the last year (following the new Spanish building regulation), there is a huge possibility to adapt this building into a nZEB with a small investment.</td></tr>
</table>

4.1.2 Public body: Ordis municipality

SEAP or alternative roadmap: SEAP

Building 2: Local Social Ajuntament d'Ordis			
Type of nZEB action	New building	Partial retrofitting	Full retrofitting
	----	X	X
Brief building description	Typology	Usability	Construction year
	Public	Multi-purpose space	1995
Status	It is multi-purpose building acting as headquarter for: sport practising, training, meetings, cinema, celebration of festivals, etc. It is a single-floor building that provides a stage, a big room, a WC, a dressing room and a bar.		
Other considerations	It was retrofitted in 1995. There is a need to consider the level of retrofitting to build a nZEB. But it cannot be reached until an exhaustive analysis has been done.		

4.1.3 Public body: Gualta municipality

SEAP or alternative roadmap: SEAP

Building 3: Serveis Municipals Ajuntament de Gualta			
Type of nZEB action	**New building**	**Partial retrofitting**	**Full retrofitting**
	----	X	----
Brief building description	**Typology**	**Usability**	**Construction year**
	Public	Multi-purpose space	2003
Status	At present it is a multi-purpose building for training workshops, meetings, celebration of festivals, etc. It is a single-floor building divided in two sections: a room for the activities and a warehouse for materials of the different events.		
Other considerations	The building architect design seems to be adapted to the environment in order to facilitate the natural lighting. For this reason, it could be a proper candidate to convert to a nZEB with a moderate investment.		

4.1.4 Public body: Diputació de Girona

SEAP or alternative roadmap: SEAP

General nZEB guidelines for the municipalities of Girona			
Type of nZEB action	**New building**	**Partial retrofitting**	**Full retrofitting**
	X	X	X
Brief building description	**Typology**	**Usability**	**Construction year**
NO PICTURE	Public	All	2015-2016
Status	The development of a general methodology to encourage nZEB actions in other municipalities will be carry out after finishing the nZEB actions of the 3 Girona municipalities which are also collaborating in AIDA project (Torroella de Montgrí, Ordis and Gualta). Also, the collaboration with Murcia municipality has been considered to write this guide.		
Other considerations	----		

4.1.5 Public body: Murcia municipality

SEAP or alternative roadmap: SEAP

General nZEB guidelines for the municipalities of Girona			
Type of nZEB action	**New building**	**Partial retrofitting**	**Full retrofitting**
	X	----	----
Brief building description	**Typology**	**Usability**	**Construction year**
NO PICTURE	Public	Offices	2016
Status	All process stages are not developed, but the commitment of a nZEB construction will be implemented to the SEAP of Murcia in order to be achieved for the next 2 years.		
Other considerations	----		

4.2 Austria

4.2.1 Public body: Gleisdorf

SEAP or alternative roadmap: SEAP

Building 1: new building			
Type of nZEB action	**New building**	**Partial retrofitting**	**Full retrofitting**
	X		
Brief building description	**Typology**	**Usability**	**Construction year**
NO PICTURE	Public	Not decided yet	Between 2014-2018
Status	In the SEAP of the municipality of Gleisdorf it was defined that the municipality will construct a new public nZEB which will fulfil following criteria: • The new building must achieve a certification level of Class A and have a global primary energy consumption of 60-80 kWh/m²y • The remaining primary energy demand must be covered by 50-70% from renewable energy sources. Furthermore an IED-process should be applied for this building.		
Other considerations	----		

4.2.2 Public body: Hartberg

SEAP or alternative roadmap: Climate and Energy Model Regions

Building 1: new building			
Type of nZEB action	**New building**	**Partial retrofitting**	**Full retrofitting**
	(X)	**(X)**	**(X)**
Brief building description	**Typology**	**Usability**	**Construction year**
NO PICTURE	Public	Not decided yet	Between 2014-2018
Status	At the moment it is not discussed resp. decided if the municipality wants to include any nZEB action in their alternative roadmap. More detailed discussions are necessary. Therefore at present it is more a hypothetic building because all options are possible (new building or retrofitting; also usability).		
Other considerations	----		

4.3 Italy

4.3.1 Public body: Merano Municipality

SEAP or alternative roadmap: SEAP

Building 1: Elementary school for Sinigo, Merano			
Type of nZEB action	**New building**	**Partial retrofitting**	**Full retrofitting**
	X		
Brief building description	**Typology**	**Usability**	**Construction year**
NO PICTURE	Public	Primary school/Library/Gym	Maybe 2015
Status	Evaluation phase of the public competition to find the design team that will design the new school. The public tender has been realized within AIDA project, with the EURAC support.		
Other considerations	----		

4.3.2 Public body: Berssanone Municipality

SEAP or alternative roadmap: SEAP

Building 2: German Music school, Brixen			
Type of nZEB action	**New building**	**Partial retrofitting**	**Full retrofitting**
	X		
Brief building description	**Typology**	**Usability**	**Construction year**
NO PICTURE	Public	German music school	Maybe 2015-16
Status	Development of the ideas' competition public tender within AIDA project with the support of EURAC team.		
Other considerations	----		

4.3.3 Public body: Bolzano Municipality

SEAP or alternative roadmap: SEAP

Building 3: Apartment building for the elderly with annexed health district service and community development centre, Bolzano			
Type of nZEB action	**New building**	**Partial retrofitting**	**Full retrofitting**
	X		
Brief building description	**Typology**	**Usability**	**Construction year**
NO PICTURE	Public	Apartment building and health centre	Maybe 2015
Status	Realization of the preliminary and definitive design through an Integrated Energy design process with teh EURAC support.		
Other considerations	Realization of the public tender for contraction services, in order to find the best economic offer that can be achieved the nZEB target. The tender will be realized within AIDA project, in		

	collaboration with EURAC team.

4.4 France

There are no specific agreements yet.

4.5 Greece

4.5.1 Municipality of Thessaloniki

SEAP or alternative roadmap: SEAP

Building: Kleanthous School Complex (4 buildings)			
Type of nZEB action	**New building**	**Partial retrofitting**	**Full retrofitting**
	----	----	X
Brief building description	**Typology**	**Usability**	**Construction year**
	Public	School	1978-1980
Status	Preliminary designs have been completed. Funding has been secured. The construction is expected to start in 2014.		
Other considerations	----		

<table>
<tr><td colspan="4">Building: 4th Elementary School</td></tr>
<tr><td rowspan="2">Type of nZEB action</td><td>New building</td><td>Partial retrofitting</td><td>Full retrofitting</td></tr>
<tr><td>X (addition to existing)</td><td>----</td><td>X</td></tr>
<tr><td>Brief building description</td><td>Typology</td><td>Usability</td><td>Construction year</td></tr>
<tr><td>  </td><td>Public</td><td>School</td><td>1978</td></tr>
<tr><td>Status</td><td colspan="3">Preliminary designs have been completed. The full project is expected to start in 2015.</td></tr>
<tr><td>Other considerations</td><td colspan="3">Funding has not yet been secured, only for partial retrofitting (building envelope without the RES part).</td></tr>
</table>

4.5.2 Municipality of Ambelokipi-Menemeni

SEAP or alternative roadmap: SEAP

Building: Ex Military Building for housing archeological works			
Type of nZEB action	**New building**	**Partial retrofitting**	**Full retrofitting**
	----	----	X
Brief building description	**Typology**	**Usability**	**Construction year**
	Public	Archeaological works building, offices	Before 1950
Status	This building will be handed out to the Attico Metro construction company. Preliminary technical discussions have taken place. It has not been yet clarified when and by whom the tender will take place.		
Other considerations	This old military building will be converted to a building for restoring archeological findings during the works of the new Thessaloniki Metro		

4.6 Hungary

4.6.1 Municipality of Gödöllő

SEAP or alternative roadmap: SEAP

Building: Alfred Hajos Elementary School			
Type of nZEB action	**New building**	**Partial retrofitting**	**Full retrofitting**
		---	X
Brief building description	**Typology**	**Usability**	**Construction year**
	Public	School	1974, retrofitting is planned to take place once the financial aspects are secured, but within the next 3-4 years)
Status	Retrofitting of the school will fit well into the municipality's concept of energy efficient public buildings; Gödöllő has been retrofitting its public building stock for some years now, and there are still work to be done. Since the financials for the project is not secured as of right now, it is still a plan which is to be carried out in the next 3-4 years.		
Other considerations	----		

Building: House of Arts, Gödöllő			
Type of nZEB action	**New building**	**Partial retrofitting**	**Full retrofitting**

		X	
Brief building description	**Typology**	**Usability**	**Construction year**
	Public	Community center	1981, first stage of retrofitting took place in 2010
Status	The top part of the building was excluded from the first stage of retrofitting works. The Municipality is keen on carrying out the second stage in the near future.		
Other considerations	----		

4.7 United Kingdom

There are no specific agreements yet.

5. ANNEX I: Implementation guide for including actions to promote nZEB within SEAP

See the following pages.

AFFIRMATIVE INTEGRATED ENERGY DESIGN ACTION

AIDA

IEE/11/832/SI2.615932

Implementation guide for including actions to promote nZEB within SEAP

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GLOSSARY OF MOST RELEVANT TERMS

Energy demand: It considers the energy required to keep the building temperatures at set point levels without considering HVAC system efficiency.

Final energy consumption: It considers the use of energy delivered at building level.

Primary energy consumption: Energy consumed at primary level, considering the next energy loads:

- Heating
- DHW
- Cooling
- Ventilation
- Auxiliaries
- Built-in-lighting

Energy label A or Class A: Proposed as EU standard for appliances and buildings, the limit values are different by region or by country. Here it refers to primary energy consumption values and proposes to adapt this rate accordingly in each country. The letter A is usually corresponding to the maximum level of building quality. If a national/local Energy Performance Certificate tool (EPC) is used, the energy balance should be calculated at primary energy consumption level and the contribution of Renewable Energy Sources (RES) should be out of this energy balance.

Energy balance: Balance between primary energy consumption and Renewable Energy Systems (RES) contribution at primary energy level. This balance is based on the 'Nearly Net ZEB' definition (see fig. 1)

1. INTRODUCTION

The new European Directive about Energy Performance of Buildings (2010/31/EU directive, EPBD) defines several commitments of Member States where is detailed that all new/refurbished public buildings have to be constructed under nZEB (nearly Zero-Energy Buildings) criteria, before than 2018.

Within the context of AIDA (Affirmative Integrated Energy Design Action) project, it is aimed to approach these commitments through **including specific actions to promote public nZEB within local SEAPs**.

A SEAP (Sustainable Energy Action Plan) is the key document in which the Covenant signatory outlines how it intends to reach its CO_2 reduction target by 2020. It defines the activities and measures set up to achieve the targets, together with time frames and assigned responsibilities.

Covenant signatories are free to choose the format of their SEAP as long as it is in line with the general principles set out in the Covenant SEAP guidelines.

There is a template of a SEAP, which constitutes the basic guide to be followed by the municipalities interested in submitting a SEAP. (http://www.eumayors.eu/support/library_en.html)

Within this template, two basic sections are considered:

1. **Baseline Emission Inventory and local baseline.**
   This section aims at defining the inventory year when the CO_2 emissions of all the sectors are computed. It constitutes the initial situation.
2. **Sustainable Action Plan.**
   This section defines the actions to be carried out to achieve the 2020 energy savings and RES production goals. Each measure or action should be described in detail and the economic costs as well as the corresponding energy savings must be calculated.

1.1 Background

A nearly Zero-Energy Building is defined as a building with a high-energy performance which leads to low consumption level. The remaining energy demand has to be mostly covered by energy from renewable sources produced 'on site'.

Regarding the energy balance, there are several ways to define a building as nZEB. Within SEAP procurements, the nZEB concept will follow the 'Nearly Net ZEB' definition. In fig. 1 the four suggested definitions are shown.

A Net Zero Energy Building is the "building system" delimited by set physical boundaries, connected to any energy infrastructure, which balance between its weighted energy loads and supplies is zero.

		Nearly Net ZEB	Net ZEB primary	Net ZEB strategic	Net ZEB emission
Building system boundary	Balance boundary	HEATING DHW COOLING VENTILATION AUXILIARIES BUILT-IN LIGHTING (only non residential buildings)	HEATING DHW COOLING VENTILATION AUXILIARIES BUILT-IN LIGHTING PLUG LOADS	HEATING DHW COOLING VENTILATION AUXILIARIES BUILT-IN LIGHTING PLUG LOADS	HEATING DHW COOLING VENTILATION AUXILIARIES BUILT-IN LIGHTING PLUG LOADS EMBODIED ENERGY
Weighting system	Metric	PRIMARY ENERGY	PRIMARY ENERGY	Whichever metric desired	EMISSION
	Symmetry	SYMMETRIC	SYMMETRIC	SYMMETRIC or ASYMMETRIC	SYMMETRIC or ASYMMETRIC
	Time dependent accounting	STATIC	STATIC	STATIC	STATIC
Net ZEB balance	Energy efficiency	NATIONAL/LOCAL ENERGY EFFICIENCY REQUIREMENTS ARE FULFILLED	NATIONAL/LOCAL ENERGY EFFICIENCY REQUIREMENTS ARE FULFILLED	ANY NATIONAL/LOCAL ENERGY EFFICIENCY REQUIREMENTS HAS TO BE FULFILLED	ANY NATIONAL/LOCAL ENERGY EFFICIENCY REQUIREMENTS HAS TO BE FULFILLED
	Energy supply	ON SITE GENERATION DRIVEN BY ON/OFF SITE SOURCES	ON SITE GENERATION DRIVEN BY ON/OFF SITE SOURCES	ON/OFF SITE GENERATION DRIVEN BY ON/OFF SITE SOURCES	ON SITE GENERATION DRIVEN BY ON/OFF SITE SOURCES

fig. 1. Suggested definitions of nZEB coming from the NZEB[1]: The main differences regard the balance metric, balance boundaries and generation systems localization[2]

[1] Proposed definitions of the Net ZEB Evaluation Tool (SHC Task 40). Download link: http://task40.iea-shc.org/Data/Sites/11/documents/net-zeb/Net-ZEB-Evaluation-Tool2.xlsm

[2] More information can be seen in Sartori I., Napolitano A., Karsten V., Net Zero Energy Buildings: A Consistent Definition Framework. In: Energy and Buildings (48), S. 220–232, 2012.

1.2 Proposed nZEB criteria definition for actions within SEAP's

To ensure a successful implementation of the recast of the EPBD relating to nZEBs, our goal is to define reasonable boundaries in the nZEB approach. These boundaries are determined as criteria from the 3 Principles for nearly Zero-Energy Buildings defined in the BPIE study report[3]: Within the context of SEAP, the nZEB definition needs some small adaptations which are summarized below:

1. **The building should achieve energy classification of Class A (based on the first principle of energy demand[3]):** The energy balance should be calculated at primary energy consumption level and without RES contribution.
2. **Balance of primary energy consumption has to be covered by a minimum renewable energy share of 50-70% (based on the second principle of renewable energy share[3]):** The BPIE study[3] makes reference to an implementation approach between 50% and 90% of the total energy delivered. CIMNE proposes a minimum of 50-70%.
3. **Primary energy consumption around 60-80 kWh/m^2·year (depending on the climatic zone) or maximum CO_2 emissions of 3 kgCO_2/ m^2·year:** This primary energy consumption is calculated as the balance between the primary energy consumption of the building (obtained after A class) and the contribution of RES at primary level. These figures were obtained from:
    a. Primary energy goals are obtained from the Ecofys study report[4] which suggested 4 different climatic zones (Catania, Paris, Budapest and Stockholm). These climatic zone goals are adapted to the AIDA project context:
        1. Mediterranean Countries (Spain, Italy and Greece) followed the goal of Catania: **50-60 kwh/m^2** y for new office buildings.
        2. France, Austria, Hungary and UK followed the goal defined by Budapest, Paris and Stockholm: **75-80 kwh/m^2**y for new office buildings.
    b. Maximum CO_2 emissions of **3 kgCO_2/ m^2**·year goal is obtained from the the third principle of energy demand of BPIE report[3]

To be coherent, the criterion must be accomplished following the order defined in the previous list.

---

[3] BPIE study report: Principles for nearly Zero-Energy Buildings (November 2011), page 54, table17: Proposed principles and approaches for implementation. Download link: http://www.bpie.eu/documents/BPIE/publications/LR_nZEB%20study.pdf

[4] Ecofys study report: Definition of common principles under the EPBD (February 2013), Task3: 6.1.6 Benchmark for nearly zero-energy buildings, page179 (figures 52-53) and page185 (figures 62-63). Download link: http://ec.europa.eu/energy/efficiency/buildings/doc/nzeb_full_report.pdf

2. SOFTWARE TOOLS TO BE USED

To perform the energy calculations, some different software tools can be used. Within AIDA project, it is proposed to use free software tools and simplified calculation software tools:

- **Simplified EPC (Energy Performance Certificate) tools, validated at national and local levels**. In Spain, there are two standardized tools for existing buildings, **CE3** and **CE3X**, and for new or refurbished buildings, **CES** and **CERMA**. (http://www.minetur.gob.es/energia/desarrollo/eficienciaenergetica/certificacionenergetica/documentosreconocidos/paginas/documentosreconocidos.aspx). In each country/region, the corresponding EPC official tools or methods can be used as long as they are able to provide overall figures for the primary energy and CO_2 emissions.
- **Simplified Energy Audit tools.** At European level, the **GENERATION** project developed a complete tool with the same name. For more information, it could be checked in the project web 'the Environment Centre (tEC)' (http://www.environmentcentre.com/rte.asp?id=31) and downloaded from the Italian partner website Provincia Di Modena (http://www.provincia.modena.it/page.asp?IDCategoria=7&IDSezione=3640&ID=79458).
- **Simplified tools for the evaluation of renewable energy production.** The AIDA project suggests solar photovoltaic installation, solar thermal or biomass boiler as a starting point for the renewable energy supply. At European level, the Joint Research Centre of the EC has developed an web interactive application called **PVGIS** which allows the assessment of solar resource and the solar PV production in all European locations. It is available at PVGIS website (http://re.jrc.ec.europa.eu/pvgis/).

  For other renewable sources, there are different tools to determine other design as **CHEQ4**, for solar thermal installations, distributed in the website IDAE (http://www.idae.es) within Spanish regions. Or **BIOHOUSING heatingtool**, for biomass, distributed in the project website BIOHOUSING (http://www.biohousing.eu.com/heatingtool/).

3. DEFINITION OF AN ACTION TO PROMOTE nZEB WITHIN SEAPs

In this project the promotion of nZEBs is limited to **public buildings**. They can be new or existing buildings with a retrofitting plan.

The action to promote nZEB must be included in the second section of the SEAP and indicators as the economic cost, energy saving and CO_2 emissions must be evaluated for this specific action.

In the following sections, a description of the steps needed to define an action to promote nZEB within SEAPs is provided

3.1 Selection of the nZEB action type to be implemented in the municipality.

The first step of the procedure consists in the selection of the potential public buildings to be considered as a nZEB referent. Once they are selected, a distinction between new building, partial retrofitting or full retrofitting should be carried out. In order to have a better structure of the information of each building, a model of datasheet is suggested (see table 1).

<table>
<tr><td colspan="4">Public body: Ajuntament de Torroella de Montgrí
<u>Action to promote nZEB within Municipal Road Map or SEAP:</u>
YES
<u>Overall planning of tenders:</u>
NO</td></tr>
<tr><td colspan="4">Building 1: Arxiu i Serveis Municipals Can Mach</td></tr>
<tr><td rowspan="2">Type of nZEB action</td><td>New building</td><td>Partial retrofitting</td><td>Full retrofitting</td></tr>
<tr><td>----</td><td>X</td><td>----</td></tr>
<tr><td>Brief building description</td><td>Typology</td><td>Usability</td><td>Construction year</td></tr>
<tr><td>  </td><td>Public</td><td>Offices</td><td>2011</td></tr>
<tr><td>Status</td><td colspan="3">It is an office building giving administrative services for the citizens. It is a 3 floor-plant building, but only 2 floors are operational.</td></tr>
<tr><td>Other considerations</td><td colspan="3">Because it was constructed in the last year (following the new Spanish building regulation), there is a huge possibility to adapt this building into a nZEB with a small investment.</td></tr>
</table>

Table 1: Model of datasheet for a public building; example case of the municipality of Torroella de Montgrí (Spain)

3.2 Definition of an nZEB action for a new public building

The nZEB action for new buildings is focused on including the acceptance criterion of section 1.2 within the public tender layout.

The definition of this action is based on the Integrated Energy Design (IED) methodology. IED proposes to take into account the energy criteria from the beginning of the project draft and it defines a communication methodology between the involved actors to achieve an integral conception of the building. It is highly recommended to include a clause to encourage IED methodology insertion in the construction projects for new public buildings. The IED methodology also proposes to include an energy section within the tender layout and in this new section is where the nZEB criterion should be included.

As an example of nZEB action for a new public building, the AIDA project has collaborated with the Murcia municipality to define a SEAP action for the construction of a new office building able to achieve nZEB criterion in 2016. In fig. 2, an example of methodology about the implementation of a nZEB action in a new office public building construction from the municipality of Murcia is shown.

Action: Construction of a nearly Zero-Energy Building (nZEB)

Description

As an example of best practices, the municipality of Murcia will construct a building of this type, intended as a reference for the city of Murcia.

The new European Directive about Energy Performance of Buildings (2010/31/EU directive, EPBD) defines several commitments of Member States where is detailed that all new/refurbished public buildings have to be constructed under nZEB (nearly Zero-Energy Buildings) criteria, before than 2018.

A nearly Zero-Energy Building is defined as a building with a high-energy performance which leads to low consumption level. The remaining primary energy consumption has to be mostly covered by energy from renewable sources produced 'in site'.

The new building to be constructed must follow the following criterion in all the stages of the building construction (project outline, executive project, construction and building use):

a) The overall building energy consumption must be determined both in final and in primary energy units.
b) The new building must achieve a certification level of Class A and have a global primary energy consumption around 50-60 kWh/m^2·y.
c) The remaining energy must be covered with renewable sources with a percentage of energy production of 50-70% of the remaining energy consumption.

Measures from the SEAP of the Murcia municipality

Page 130 from the Sustanaible Energy Action Plan from the municipality of Murcia:

Descripción del Plan de Acción de Energía Sostenible de Murcia

MEDIDAS DEL PLAN DE ACCIÓN DE ENERGÍA SOSTENIBLE DE MURCIA

SECTORES & campos de actuación	Acciones/ medidas clave por campo de actuación	Institución-Empresa Respon-sable	Periodo temporal de implementación de la actuación [fecha de inicio y fin]	Coste estimado (€) por acción /medida	Ahorro energético esperado por medida [MWh/ acción al año]	Producción de energía renovable esperada por medida [MWh/ acción al año]	Reducción de CO2 esperada por medida [tCO2/ año]	Objetivo de ahorro energético por sector [MWh] en 2020	Objetivo de producción local de energía renovable por sector [MWh] en 2020	Objetivo de reducción CO2 por sector [tCO2] en 2020	Reducción de CO2 acumulada hasta 2020 [tCO2/ acción]	Ahorro energético acumulado hasta 2020 [MWh/ acción]	Ahorro económico acumulado hasta 2020 [€/ acción]
	Acción 8: Utilización de iluminación de alta eficiencia y bajo consumo en los nuevos edificios municipales o los rehabilitados	Ayuntamiento de Murcia	2010-2020	0	1.450	0	682				6.380	14.500	2.030.000
	Acción 9: Construcción de un edificio municipal de consumo casi nulo.	Ayuntamiento de Murcia	2020	360.000	331	100	190				948	1.655	231.700
	Acción 10: Instalación innovadora a modo experiencia piloto en edificio municipal de una instalación solar de media temperatura o equipo de refrigeración solar.	Ayuntamiento de Murcia	2012-2020	20.000	18	18	8				16	36	4.987
	Acción 11: Mejora de la eficiencia energética y apoyo solar de instalaciones solares térmicas de dependencias municipales. Conversión 8 calderas gasoil a gas natural. Apoyo solar para ACS o vaso en 35 instalaciones	Ayuntamiento de Murcia	2010-2020	1.055.000	1.238	1.238	11.758				58.789	6.192	433.462
	Acción 12: Mejora de la eficiencia energética Bario Espíritu Santo. Proyecto Urban	Ayuntamiento de Murcia	2012-2015	30.000	42	42	401				2.003	212	29.723
	Acción 13: Campaña Ahorro Energético Funcionarios	Ayuntamiento de Murcia	2010-2012	30.000	126	0	55				444	1.008	141.120
	Acción 14: Sistema de monitorización y control de consumo eléctrico edificios municipales a partir de contadores de telegestión	Ayuntamiento de Murcia	2010-2016	290.500	1.126	0	554				2.218	5.040	705.600

fig. 2. Example of nZEB action for new public buildings

3.3 Definition of a nZEB action for the refurbishment of an existing public building

This action is more complex than the one of a new building because a refurbishment is depending on the existing situation of the building. In this case, the action objective is focused on evaluating the initial situation (baseline scenario) of the existing public building and to set up which are the necessary improvement measures for a partial/full refurbishment in order to achieve the nZEB criterion.

Before the assessment, it is highly recommended to pay attention in the building to be retrofitted. It is preferable to work in close cooperation with an energy performance expert and to give priority for the buildings with highest energy consumption and more potential in set out of the improvement measures.

In Spain, three municipalities haven been selected as pilot testing: Torroella de Montgrí, Ordis and Gualta. Each municipality selected a public building suitable to achieve nZEB criterion in its retrofitting project. From this three buildings, the one which highest energy savings potential was used as an example of methodology used to determine nZEB action for an existing building.

The steps needed to define this nZEB action are described in the next sections.

3.3.1 Selection of the simulation tool for each nZEB level criterion

The next table links the nZEB acceptance criterion for Spain and the software tool proposed for the calculations.

nZEB acceptance criteria	*Calculation method*	*Software tools proposed*
Criterion 1: Building energy classification of Class A (calculated at primary energy level).	To determine the total energy demand of the building, the final energy consumption, the primary energy consumption and, finally, to evaluate the primary energy of CO_2 emissions	CES/CERMA (new buildings), CE3, CE3X (existing buildings), GENERATION (all).
Criterion 2: Balance of primary energy consumption has to be covered by a minimum renewable share of 50-70% energy production.	To calculate and define both the power and the energy production of the renewable energy supplier system.	PVGIS (PV systems), CHEQ4 (solar thermal), BIOHOUSING (biomass boilers)
Criterion 3: Primary energy consumption of 50-60 kWh/m^2·year or maximum CO_2 emission of 3 Kg CO_2/m^2·year.	To calculate the total balance of primary energy.	CES/CERMA (new buildings), CE3,CE3X (existing buildings), GENERATION(all).

Table 2: nZEB acceptance criteria and software tools proposed in AIDA project

3.3.2 Baseline scenario definition using CE3 software

The official EPC software tool for Spain was used to evaluate the initial situation of the building. After data insertion of the building parameters and of the climate region, the results obtained are:

Current Situation	*Heating*	*Cooling*	*DHW*	*Lighting*	*Total*	*Energy Class*
Building energy demand (kWh/m^2y)	43,46	13,32				Heating: D Cooling: E
Final energy consumption (Kwh/m^2y)	8,69	2,66		149,15	160,51	D
Primary energy (kWh/m^2y)	27,94	9,93	_	189,53	227,40	D
CO2 emission ($kgCO_2/m^2y$)	6,95	2,47	_	47,13	56,55	D

Table 3: Baseline definition; example of the Spanish building

In this case, the final energy consumption is smaller than the energy demand, both in heating and cooling, because the heating and cooling system is a very efficient VRV heat pump with a COP around 5.

3.3.3 Energy related pathologies and improvement measures

The official software allows for a parametric analysis of the necessary measures to improve the energy performance of the building. In table 4, a summary of the detected deficiencies and its corresponding correction measure is shown.

Detected deficiencies	*Improvement measures to carry out*
Summer heat gains within the South façade.	Measure 1: Installation of shading protection devices in the ground floor above the South façade (in front of entry courtyard) .
High electric energy consumption of the building due to the lighting system.	Measure 2: Replacement of the existing lighting devices by LEDs.
Lack of renewable energy production.	Measure 3: Solar Energy PV facility for self-supply

Table 4: Detected deficiencies and improvement measures to carry out for the 'Arxiu i Serveis Municipals Can Mach' public building from the municipality of Torroella de Montgrí

Once measures are identified, it is recommended to differentiate between measures to achieve A class certification, and measures to cover a part of the remaining energy demand with renewable energy production. Therefore, two criteria should be reached; the first two measures are corresponding to the criterion 1 from nZEB and the second, to the criterion 3.

3.3.4 Achievement of the criterion 1

In this section, the effect over the energy consumption and over the building energy label of measures 1 and 2 of table 4 is evaluated using the CE3 software. The obtained results are expressed as energy savings achieved in primary energy. They are shown in table 5.

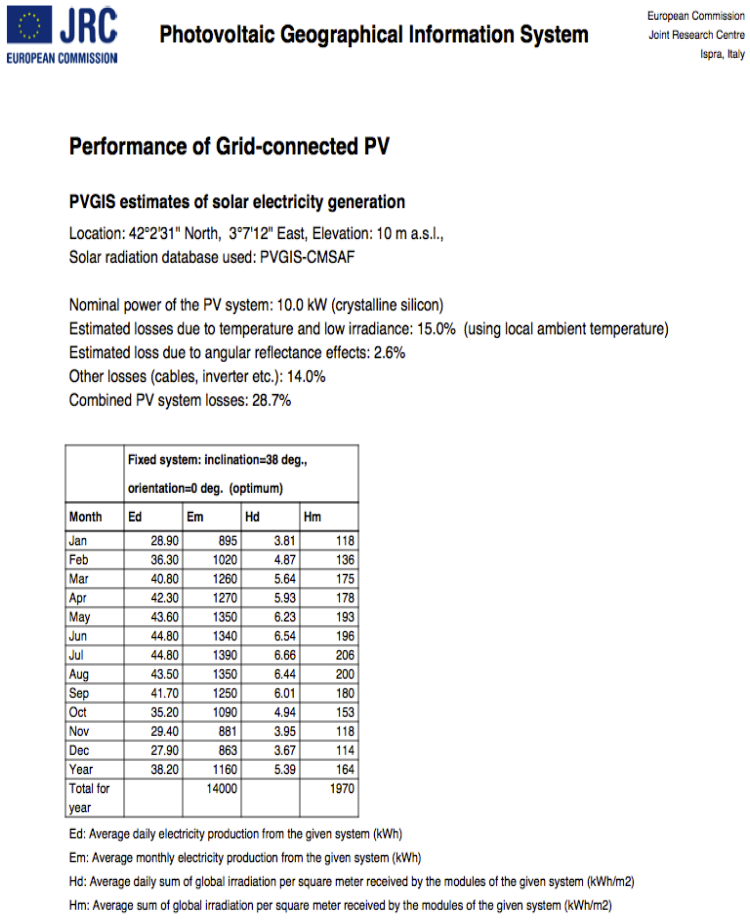
Case N	Improvement measures	*Primary Energy savings (kWh/m2y)*					Energy Class
		Heating	Cooling	DHW	Lighting	Total	
1	None	0	0	0	0	0	D
2	1	11,39	-1,29	0	0	10,10	D
3	2	17,13	-4,26	0	150,32	163,19	A
4	1+2	11,39	-1,29	0	150,32	160,42	A

Table 5: Results from CE3 of the effect in primary energy of each improvement measure

As can be seen, the Case 4 allows achieving the maximum level of energy classification (A). Considering that the baseline of this building (see table 3) was 227,40 kWh/m^2·year and the energy savings achieved applying measure 1 and measure 2 (case 4 of table 5) are 160,42 kWh/m^2·year, an overall energy saving of 71% maybe achieved by applying these two measures.

3.3.5 Achievement of criterion 2

The measure to produce high percentage of the remaining energy from Renewable Energy Sources (RES) (measure 3 of table 4) was analysed through PVGIS web app (simplified tool for photovoltaic systems design). In this specific example, a production with PV systems about 50 % of the remaining energy was selected. The result of this example is shown in fig. 3. The proposed installation is a PV roof system of 10 kW with a predicted energy production of 14 MWh/year.



JRC EUROPEAN COMMISSION

Photovoltaic Geographical Information System

European Commission
Joint Research Centre
Ispra, Italy

Performance of Grid-connected PV

PVGIS estimates of solar electricity generation

Location: 42°2'31" North, 3°7'12" East, Elevation: 10 m a.s.l.,
Solar radiation database used: PVGIS-CMSAF

Nominal power of the PV system: 10.0 kW (crystalline silicon)
Estimated losses due to temperature and low irradiance: 15.0% (using local ambient temperature)
Estimated loss due to angular reflectance effects: 2.6%
Other losses (cables, inverter etc.): 14.0%
Combined PV system losses: 28.7%

	Fixed system: inclination=38 deg., orientation=0 deg. (optimum)			
Month	Ed	Em	Hd	Hm
Jan	28.90	895	3.81	118
Feb	36.30	1020	4.87	136
Mar	40.80	1260	5.64	175
Apr	42.30	1270	5.93	178
May	43.60	1350	6.23	193
Jun	44.80	1340	6.54	196
Jul	44.80	1390	6.66	206
Aug	43.50	1350	6.44	200
Sep	41.70	1250	6.01	180
Oct	35.20	1090	4.94	153
Nov	29.40	881	3.95	118
Dec	27.90	863	3.67	114
Year	38.20	1160	5.39	164
Total for year		14000		1970

Ed: Average daily electricity production from the given system (kWh)
Em: Average monthly electricity production from the given system (kWh)
Hd: Average daily sum of global irradiation per square meter received by the modules of the given system (kWh/m2)
Hm: Average sum of global irradiation per square meter received by the modules of the given system (kWh/m2)

fig. 3. Results from PVGIS of the Solar PV production in the Spanish building

3.3.6 Achievement of the criterion 3:

This point is intended to verify the result of nZEB refurbishment action. A summary of the results of this example is shown in table 6.

nZEB criteria	*Software tool*	*Baseline scenario*	*Result*	*Improvement measures*
1	CE3	Class D	Class A	Class A retrofitting measures
2	PVGIS	0% RES	PV production: 14.000 KWh/y 50% RES	RES system measures
3	Excel of Annex nZEB	227,40 kWh/m^2·year 56,55 Kg CO_2/m^2·year	66,98 kWh/m^2·y 7,07Kg CO_2/m^2·y	All

Table 6: Results for the nZEB refurbishment of the 'Arxiu i Serveis Municipals Can Mach' public building from the municipality of Torroella de Montgrí.

3.3.7 Economic quantification

Within the AIDA project, an EXCEL file has been developed to help in economic calculations of the nZEB measures. It should be included into the SEAP action as an Annex. It is divided in four sections:

a) *Building datasheet:* Includes the public building description relevant for the nZEB action.

b) *Energy evaluation of retrofitting measures and RES production:* This section summarizes the results about the primary energy consumption and CO_2 emissions for the baseline and after retrofitting measures. It also includes the results of the RES systems proposed to achieve a nZEB building.

c) *Economic calculations:* Expert knowledge is required to have a real reference of the costs for a nZEB. Every partner must select the appropriate data base to approximate the economic costs of each retrofitting measure and of the RES based on the local market constrains. Once this costs are obtained, the excel sheet provides a method to evaluate the abatement costs and depreciation period.

d) *nZEB action summary:* This section is formed by the summary of the SEAP indicators which will be embedded into the action template.

The results obtained from excel spread sheet are shown in table 7

nZEB action summary	*Main original SEAP fields*				*Added fields by the AIDA project*	
SEAP measures	Estimated costs per action/measure (€)	Expected energy saving per measure (MWh/y)	Expected renewable energy production per measure (MWh/y)	Expected CO2 reduction per measure (Tn CO2/y)	Payback period (y)	Abatement cost (€/kg CO2 saved)
Class A retrofitting measures	43.548,14	48,61	0,00	17,46	3,24	0,77
RES system measures	23.900,00	0,00	14,00	3,78	7,15	0,88
Overall nZEB action	**67.448,14**	**48,61**	**14,00**	**21,24**	**4,67**	**0,68**

Table 7: nZEB action proposal for the refurbishment of the existing public building 'Arxiu i Serveis Municipals Can Mach' from the municipality of Torroella de Montgrí

3.3.8 Insertion of the results into the official templates of SEAP

The Diputació de Girona, as a SEAP coordinator for the municipalities from the Girona region, has developed a methodology guide and templates for the municipalities interested in go along to a SEAP. Also, the general guides and templates are disposable at the official webpage of the Covenant of Mayors, in the official documentation section (http://www.eumayors.eu/index_en.html).