

# D1.4: 1st Progress Report



## **COST REDUCTION AND MARKET ACCELERATION FOR VIABLE NEARLY ZERO-ENERGY BUILDINGS**

Effective processes, robust solutions, new business models and reliable life cycle costs, supporting user engagement and investors' confidence towards net zero balance.

CRAVEzero - Grant Agreement No. 741223  
[WWW.CRAVEZERO.EU](http://WWW.CRAVEZERO.EU)

Co-funded by the Horizon 2020

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# D1.4: 1st Progress Report

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# FOREWORD

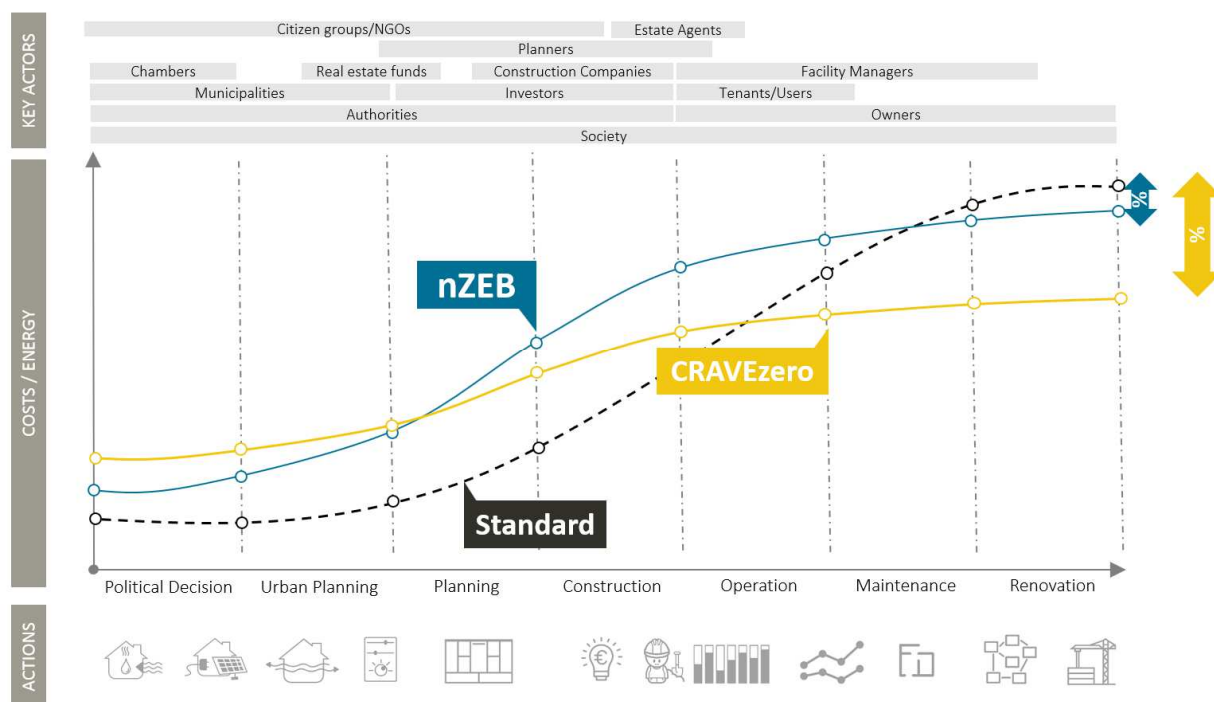
This first progress report was drafted under work package 01, part of the Horizon2020 - CRAVEzero project.

Cost optimal and nearly zero energy performance levels are principles initiated by the European Union's (EU) Energy Performance of Buildings Directive, which was recast in 2010. These will be significant drivers in the construction sector in the next few years because all new buildings in the EU from 2021 onwards are expected to be nearly zero energy buildings (nZEBs).

While nZEBs realized so far have clearly shown that the nearly-zero energy target can be achieved using

existing technologies and practices, most experts agree that a broad-scale shift towards nearly-zero energy buildings requires significant adjustments to current building market structures. Cost-effective integration of efficient solution sets and renewable energy systems are the major challenges.

CRAVEzero focuses on proven and new approaches to reduce the costs of nZEBs at all stages of the life cycle. The primary goal is to identify and eliminate the extra costs for nZEBs related to processes, technologies, building operation and to promote innovative business models considering the cost-effectiveness for all the stakeholders.



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# 1.MAIN OBJECTIVES AND OVERVIEW OF THE PROGRESS

## 1.1. OVERALL OBJECTIVES

The main objectives of the first reporting period of CRAVEzero have been the following:

### OBJECTIVE 01: TO OPTIMIZE THE PLANNING ACTIVITIES AT DIFFERENT LEVELS, FROM URBAN AND SPATIAL PLANNING TO THE BUILDING DETAILED DESIGN

- (1) First of all, the consortium has almost completed the evaluation of cost relevant information, business models and technical solutions for all frontrunner buildings during the first project period.
- (2) A process map that connects the entire project lifecycle for design, planning, operation and end of life phase has been developed, with a special focus on country-specific requirements and approaches.

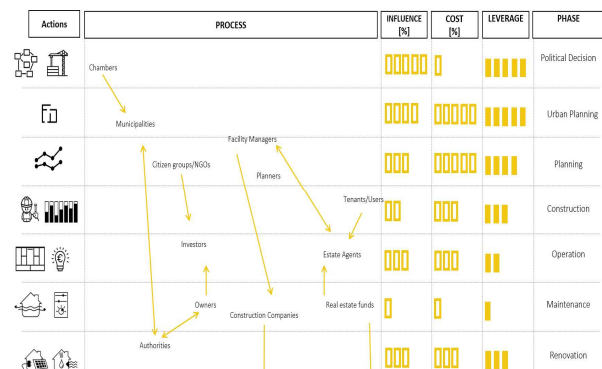


Figure 1: Overview of methodology to display planning activities at different levels

### OBJECTIVE 02. TO FOSTER THE INSTALLATION OF COST-EFFECTIVE TECHNOLOGIES ACCORDING TO LOCAL CONTEXTS AND NEEDS

- (1) A data collection of materials and information to define effective low-cost technology solution sets for new nZEBs has been finished and documented in a database. The main sources adopted are the project case studies, literature and previous projects and data from the practices of the Industry Partners.
- (2) An operative methodology to achieve the best conditions towards optimal cost nZEBs exploring the concept of integrating nZEB- technologies (WP4) and business models (WP5) in the whole planning, construction and operation process has been set-up.

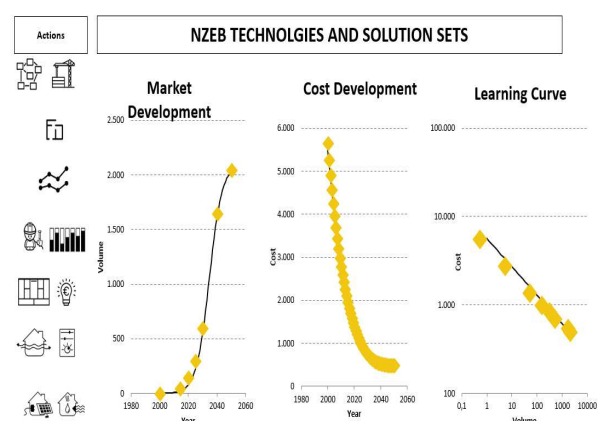


Figure 2: Learning curves and cost development of cost-effective technologies

## OBJECTIVE 03. TO DEFINE RELIABLE LIFE-CYCLE COST MODELS FOR NZEB

- (1) An extensive assessment of the cost-effectiveness of the 12 CRAVEzero - NZEB case studies as defined by the EU KPIs and existing literature, taking into account the energy and economic balance, Indoor Environmental Quality, functionality, and real estate value have been finished.
- (2) A database for benchmarking actual NZEB life cycle costs (LCC) including urban and building planning, construction, commissioning, operation, maintenance, management, end-of-life, has been developed.
- (3) Inventory of different existing business models, considering: i) the CRAVEzero case studies, ii) the approach in the participating countries and iii) examples of successful case stories have been drafted.
- (4) Already existing and new examples for innovative nZEB business models have been collected showing advantages to different types of stakeholders, for example, planners, developers, construction companies and users, while positively contributing to the environment and society.

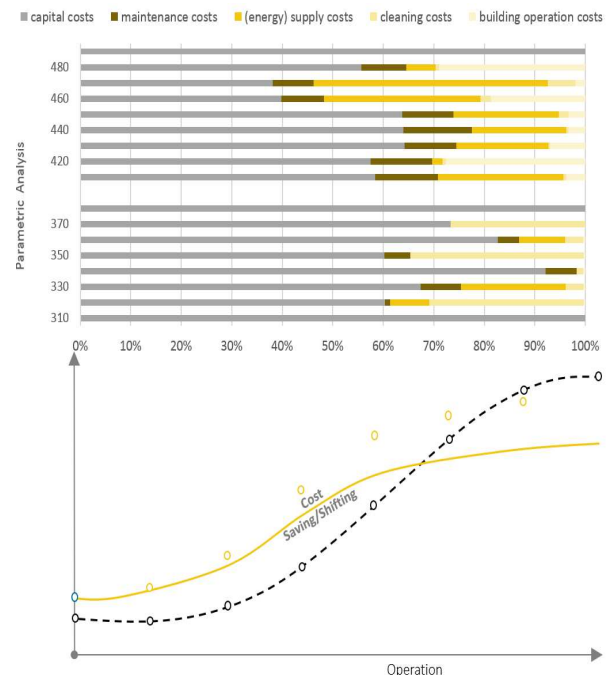


Figure 3: Life-cycle cost models for NZEBs

## OBJECTIVE 04. TO IMPROVE THE QUALITY OF THE BUILDING IN A USER-CENTRED PERSPECTIVE

Throughout the whole life cycle of nZEBs action that improve the quality of a building in a user-centered perspective have been addressed. The relation of the actions to the specific stakeholders and resulting co-benefits like architectural quality, comfort, were integrated into the overall CRAVEzero pinboard and are addressed in the reports where appropriate. Currently, this data is being transformed in knowledge for the final users, facility managers, and owner, foreseeing different reading approaches.

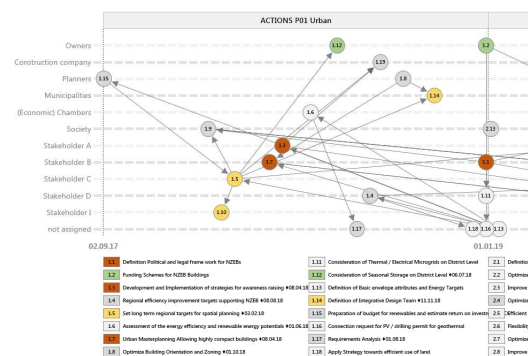


Figure 4: Stakeholder Analysis and Co-benefits

## OBJECTIVE 06. TO DEMONSTRATE THE EFFECTIVENESS OF THE CRAVEZERO APPROACH

- (1) Constant communication among the project partners, the “Advisory Board (National Implementation Working Groups),” among the different WP-leaders
- (2) Financial and administrative management of the project
- (3) Set up of an extensive communication plan with targets for the communication with and events for the target groups. Project material supports these activities
- (4) The website and different project material has been developed, and the consortium started with dissemination activities ([www.cravezero.eu](http://www.cravezero.eu))
- (5) Social media activities started

Some of the partners started planning new NZEBs, in line with the CRAVEzero approach








Actions	Image	Role Model/ Pioneering Role	creative quality	Durability	user satisfaction	Energy Savings	Resource Savings	Value Development	Lettability	Rental Income	Comfort
	+				++				++		+
		++	++				+		+		
				+	-		+			+	
			+	-		+		+			
		++	-				+				+
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				+	++						+

Figure 5: Planning of new NZEBs, in line with the CRAVEzero approach



## 2.EXPLANATION OF THE WORK CARRIED OUT PER WORK PACKAGE

### 2.1. WP 01 PROJECT MANAGEMENT: PROGRESS OF WORK - DETAILED DESCRIPTION

TASK	OBJECTIVE	PROGRESS	% COMPL.
Task 1.1 Project Coordination and Resource Monitoring	To ensure the realization of the project objectives and deliverables on time and budget Perform the financial and administrative management of the project	Project monitoring, controlling and risk management is done by day-to-day communication and regular Skype and WebEx meetings supporting the by now three personal meetings with the partners. The progress of work, as well as the resource usage and budget, is checked and validated according to the project schedule every month. The coordination of activities progress, review and approval of reports and deliverables, and the resolution of problems of technical nature is handled under the responsibility of the corresponding work package leaders.	ongoing
Task 1.2 Communication and trans-national cooperation	To support communication among the project partners, the “Advisory Board (National Implementation Working Groups)”, among the different WP-leaders. To take care of the quality control and progress evaluation. Administrate the communication and reporting to the European Commission. To organize the internal review of deliverables before the submission to the European Commission	All work package leaders organize regular Skype or WebEx meetings and spread information by this. Project progress is monitored by a project management handbook. An Owncloud server is established to ease this communication further and upcoming data exchange and substitute the initially foreseen internal member area on the public website. The final dissemination and exploitation plan was defined in December 2017 and in full action. The project website and a Twitter social media channels are online and active.	ongoing
Task 1.4 Workshops and project meetings	To organize workshops and project meetings	Two main project meetings held (kick-off, progress), minutes have been finished supported by meeting presentations. Additional Skype and WebEx meeting support the day-to-day communication. The core group meets once a month discussing the challenges and the work packages progress. The first Advisory Board meeting as well as the meetings of the national implementation working group are organized and will be held in October 2018 at the ISEC conference.	ongoing

## 2.2. WP 02 LIFE CYCLE COSTS OF NZEBs / CASE STUDIES

The scope of this WP is to provide the baseline knowledge of the current nZEB practices and legislative framework, with a special focus on the costs and performances during all the phases of the building life cycle. The main aspects considered are connected to: i) the EU policies introducing targets and requirements for nZEBs in the Member States, ii) available Life Cycle Cost evaluation tools, iii) Key Performance Indicators for nZEBs, iv) actual nZEB performances and costs of te CRAVEZero case studies.

TASK	OBJECTIVE	PROGRESS	% COMPL.
Task 2.1 Analysis of nZEB definitions	To analyze the NZEB definitions and relative KPIs implemented by EU member states, with a focus on CRAVEzero countries	Eurac, the task leader, carried out an analysis on the sources at EU level including literature, reports from EPBD Concerted Action and EU funded project (e.g., IEE ZEBRA 2020, ASIE). Further than the EPBD implementation, the analysis dealt with the construction market and with an analysis of the nZEB features across EU, starting from the data of the IEE project ZEBRA 2020. Following the results of the literature review at EU level, eurac identified the central reference laws and regulations in the CRAVEZero countries (Italy, France, Germany, Austria and Sweden) and analysed the parts dealing with nZEB minimum requirements, in order to create a detailed overview of the required performances in the countries of interest. The text illustrates the performance requirements of the envelope, HVAC system, and renewables to be installed. The partners reviewed the text dealing with their country and provided feedback to improve the level of detail of the reported information. Deliverable 2.1 has been finished and uploaded on the website.	100% ■■■■
Task 2.2: Life Cycle Cost database for nZEB	To collect and organize data on the Life Cycle Cost of a set of case studies	Eurac, with the feedback of ATP, Fraunhofer ISE, AEE - INTEC, and Skanska, prepared a detailed LCC data collection template, following the structure provided by the CEEC (European Committee of the Construction Economists). The partners completed the template filling in the data and information requested for the case studies: ATP (3 cases), Bouygues (3 cases), Skanska (2 cases), K&M (1 case), Moretti (2 cases). Moreover, following the training provided by AEE - INTEC, the partners completed an energy analysis with PHPP tool of the case studies. Eurac organized the information of the case studies in a structured datasheet, and arranged a spreadsheet for the LCC calculation, estimating the energy and maintenance cost. After a literature analysis, each defined a set of normalization factors in order to compare the costs of the case studies and to have a comprehensive overview of the costs for design, construction, operation, and maintenance. Eurac prepared the deliverable D2.2 and the spreadsheet for the publication on the website	100% ■■■■

TASK	OBJECTIVE	PROGRESS	% COMPL.
Task 2.3: Repository of LCC tools to support the nZEB design	To identify and analyze the available tools for Life Cycle Cost evaluation	Eurac established the framework for analyzing the tools and comparing the features, according to the input-output structure provided by CEEC, and created a database for classifying the features. Eurac identified a set of freeware tools available on the web and analyzed the information, which has been stored in the database. ATP and AEE - INTEC provided information on further tools that have been added to the database. Eurac prepared the deliverable 2.3.	100% ■ ■ ■ ■
Task 2.4: Set of KPIs to evaluate the nZEB performances	To define a set of Key Performance Indicators to evaluate the cost of the nZEB according to the performances	Eurac performed a literature analysis on the indicators used for assessing construction costs and performances. Accordingly, Eurac prepared a preliminary list that shared with ATP, AEE - INTEC, Fraunhofer, and Skanska, in order to collect feedback on the relevance of the selected KPIs. According to the results of this survey, Eurac set-up the calculation in the spreadsheet.	75% ■ ■ ■ □
Task 7.2: Preparatory study for prototypical implementation	To test the tools developed within the design of a new nZEB	Eurac organized a meeting with 3i and Moretti to discuss the available case studies for the prototypical implementation of the CRAVEZero results.	5% ■ □ □ □

## 2.3. WP 03 COST REDUCTION POTENTIALS IN PROCESSES

### STATUS AND PROGRESS – MAIN ACHIEVEMENTS

An effective methodology to achieve the best conditions towards cost optimal NZEBs exploring the concept of integrating NZEB- technologies (WP4) and business models (WP5) in the whole planning, construction and operation process was developed in the first year of the project and is currently evaluated together with the industry partners. An extensive process-map and a database displaying an overview of relevant decisions and co-benefits, involved players supported by relevant cost structures potentials to reduce costs in all stages of the process is under development. The current outcome of this work package is a process map that connects the entire project lifecycle for design, planning, operation and end of life phase. This process map is a workflow that points out cost reduction potentials through all the stages of the process where all the different parts are linked to provide summaries and reports to the decision-makers in leadership roles.

### PROGRESS OF WORK – DETAILED DESCRIPTION

TASK	OBJECTIVE	PROGRESS	% COMPL.
Task 3.1 Cost reduction potentials in processes	To reduce costs and accelerate processes, and assure the quality of NZEBs the right decisions have to be taken at the ideal time of the overall process.	For all life cycle phases possible decisions, co-benefits and methods for processes were described and structured in a database. As a second step, potentials for cost reduction for these processes are being quantified. The first version of a “lean processes” is developed the covers all life cycle phases.	50% ■ ■ □ □
Task 3.2 Development of a framework for ensuring the quality of the new NZEB.	To develop a process map that connects the entire project lifecycle for design, planning, operation and end of life phase.	Benchmarks and evaluation procedure for assessing the quality level of new nZEBs for effective performance-based tenders were developed.	70% ■ ■ ■ □
Task 3.3 Development of an optimized integrated building design process.	To reduce costs and accelerate processes, and assure the quality of NZEBs the right decisions have to be taken at the ideal time of the building design process.	Possible decisions, co-benefits and methods (e.g., optimized integrated planning processes, BIM, lean management, improved architectural quality, functionality and usability, reduction of the embedded failure costs...) for all processes in this phase are described, and potentials for cost reduction in the concerning the nZEB standard were structured in a database.	50% ■ ■ □ □

TASK	OBJECTIVE	PROGRESS	% COMPL.
Task 3.4 Construction process / Development of a NZEB - lean construction management.	To reduce costs and accelerate processes, and assure the quality of NZEBs the right decisions have to be taken at the ideal time of the construction process	Cost reduction potentials for nZEB construction processes (an e.g. drop of the construction time, prefabrication, reduction of the embedded failure costs...) considering the needs of all involved stakeholders were structured in a database.	50% ■ ■ □ □
Task 3.5 Building operation process.	To reduce costs and accelerate processes, and assure the quality of NZEBs the right decisions have to be taken at the ideal time of the building operation process.	Potentials for cost reduction in the building operation process were structured in a database. Cost savings due to post-construction reviews, user behavior, occupant involvement, monitoring layouts, components, and commissioning approach, optimized future maintenance, are currently being quantified.	50% ■ ■ □ □

## 2.4. WP 04 TECHNOLOGIES

### STATUS AND PROGRESS – MAIN ACHIEVEMENTS

The focus of the work conducted in WP 04 was Task 4.1 and the preparation of deliverable D4.1. In a first step, a database was developed and validated by the project partners for collecting relevant techno-economic data of relevant technologies. The structure followed the approach of WP 02 as much as possible. In a second step, all project partners provided data from the CRAVEzero Case Studies and additional desk research. The data is the basis for (i) the calculation of cost reduction potentials, (ii) the definition of low-cost (and low-tech) technology solution sets for nZEBs and (iii) simulations and optimizations in WP 06.

Additionally to the data collection and filling of the database, a methodology to calculate cost reduction potentials of single technologies was developed, validated and then applied based on the cost information in the database. There are in principle two approaches for the estimation of cost reductions: (i) bottom-up Approach (detailed analysis of all elements of cost and optimization of single elements) and (ii) top-down approach (cost reduction due to cumulative production; economies of scale and increased know-how). Approach (ii) is mainly used for the calculation of cost reductions as the needed data is more easily to acquire. The detailed bottom-up analysis is only conducted for the most relevant technologies. Based on the results of the described tasks, deliverable D4.1 “Guideline II: NZEB Technologies: Report on cost reduction potentials for technical NZEB solution sets” is generated.

## PROGRESS OF WORK - DETAILED DESCRIPTION

TASK	OBJECTIVE	PROGRESS	% COMPL.
Task 4.1 Break down case studies for specific technologies, renewable energy systems	<p>Prepare repository technology sets</p> <p>Validate repository structure</p> <p>Cross-comparison installed technologies in case studies (tech. &amp; cost parameters)</p> <p>Comparison of additional data from the literature</p> <p>Method to identify cost reduction potentials</p> <p>Validate and apply Method to identify cost reduction potentials</p>	<p>The twelve case study buildings of the project partners were analyzed and a database for relevant techno-economic data was created. In the first step, all data records of the buildings were examined individually. The technologies used and the available technical and economic parameters were listed for the respective projects. The data from the case study buildings were also transferred to a database developed and distributed within the WP04 core group. In the database, all relevant data of nZEB technologies is collected. Feedback from the partners concerning structure and data was incorporated into the final structure. The coordinated and final database structure was sent out within the core group and partners filled the database with own data and additional data from the literature. The additional data in the database allowed a cross comparison (and benchmarking) of the case studies. The case studies were compared in tables and graphically with additional data from the literature. The collected cost data was extracted from the database as base values for the methodology to calculate cost reduction potentials for the various technologies.</p> <p>A top-down approach was developed to identify cost reduction potentials of the relevant technologies. In addition, for the most important technologies studies in which a detailed bottom-up methodology to analyze cost reduction potentials were applied, were taken into account. The top-down method is based on the assumption that costs decrease in relation to an increased cumulative production due to the fact that more experience leads to technological performance improvements and thereby cost reductions, as well as cost reductions due to economies of scale. The first step was therefore to determine the cost database and the current cumulative volume as a starting point and the learning rates based on past developments for each technology. Furthermore, a forecast market curve was calculated on the basis of data from a scenario describing a possible future development of the German energy system, which was provided internally at ISE.</p> <p>The data obtained were used to create a learning curve and to calculate a cost development curve using the learning and market curve. The cost development curves were developed for each analyzed technology and illustrate the cost reduction potentials graphically. To compare the different technologies, graphs were developed showing the development of all</p>	<p>95%</p> <p>■ ■ ■ ■ ■</p>

cost reduction potentials in percent up to 2030 and 2050. They clearly show which technologies have the greatest potential for cost reduction. It also reveals the temporal developments for the various technologies.

D 4.1 Guideline II: NZEB Technologies: Report on cost reduction potentials for technical NZEB solution sets: under examination; finalization end of August 2018

Task 4.2: Development of low costs solutions sets (construction concepts, building technical systems including renewables)	<p>Assessment of technical performance and LCC for NZEB technologies and solution sets</p> <p>Develop solution matrix regarding cost savings of more durable, technical solution sets and combinations of technologies</p> <p>Definition of low-tech technologies, materials and reduced renovation and maintenance costs</p>	<p>The analysis started in parallel to technology-specific analysis in Task 4.1. In order to identify currently installed technology sets, the CRAVEzero partners provided system schematics of their Case Studies. Additionally, information from other projects of the partners and an additional desk research will be taken into account to define promising low-cost (and low-tech) solution sets for nZEBs. Result: Deliverable D4.2: Optimized NZEB- solution sets</p>
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10%  


## 2.5. WP 05 NZEB BUSINESS MODELS

### STATUS AND PROGRESS – MAIN ACHIEVEMENTS

Within this WP a method to analyze business models related to NZEBs has been developed together with the involved partners. The project partners used this method to describe their own business model and validate these models. A challenge for all partners was the description of revenue streams and related cost for the related business models. The business models from the project partners are sometimes related to the presented case studies. One lesson was the fact that the business models are almost always embedded into the “normal” business approach and it seems difficult to separate the NZEB business approach from the “normal” business approach.

## PROGRESS OF WORK - DETAILED DESCRIPTION

TASK	OBJECTIVE	PROGRESS	% COMPL.
Task 5.1 Identify proven and potential for 'Win-win-win' sustainable business for all involved stakeholders according to the process in WP3	Comparative analysis of current European business models for NZEBs and their frameworks/ ecosystems with a clear focus on quantifying and qualifying effectiveness. Identifying stakeholders (policymakers in the field, end-user representatives, collectives, SME suppliers and receivers of energy services, academia, business developers, consultants, technology developers, and NGOs in the field) for proven NZEB business models.	<p>A method to describe, validate and compare business models was described which is based on several steps:</p> <ul style="list-style-type: none"> <li>- A business model canvas based on Osterwalder's business model canvas and guideline how to fill the clusters describing the business model</li> <li>- Consistency checks to check questions like: Are there any contradictory points? Is everything filled out in a logic way? Does the model differ to alternatives?</li> <li>- Elaboration and description of success factors for the described business models</li> <li>- A MICMAC method matrix giving values to described success factors for business models</li> <li>- An Influence-Dependence-Chart with factors that have a strong influence on the system of a business model and those that depend on its' stability</li> </ul> <p>For each step project, relevant documents have been produced for the use of the project partners and also for further use on the CRAVEzero web page. The method with its steps was applied by the project partners, they had to describe and validate the business models. In summary 13 business models have been presented by the project partners. These models have been passed the method with its several steps with several iteration loops. All partners have been requested to participate in the whole method, giving their feedback on the several steps and finally evaluate each other's business model. A business model overview has been presented. As a reaction to the challenge to find business method related cost and revenue streams, additional actions have been developed. One action will be to relate the business models with the cost spreadsheet within WP 2 – depending on available cost within the developed cost spreadsheet- with the presented business model. Another action will be the description of cost and revenues from a not involved partner evaluating one relevant business model. A third action was developed and presented to the partners in giving a subjective opinion of the models in ranking the models by giving value points for customer and business model value. This will be ranked afterward. In parallel an extended business model repository has been started, incorporating additional business models that will be found by the project partners screening their work environment and making an internet search of related business models. The results of the found business models will be presented on the CRAVEzero web page for further use of the public. The first steps for the presentation can be seen here: <a href="http://www.cravezero.eu/development-of-new-business-models/">http://www.cravezero.eu/development-of-new-business-models/</a> Actually without detailed content. It is planned to implement the possibility to create one's own business model on the website also with pre-defined content which can be chosen by a menu structure.</p>	80% ■ ■ ■ □



## 2.6. WP 8 – DISSEMINATION

*\* Please find a more detailed description of the dissemination activities in chapter 8.*

TASK	OBJECTIVE	PROGRESS	% COMPL.
Task 8.1 General dissemination management activities	To optimize the effect of the project through dissemination activities by promoting the results and the achievements of the relevant stakeholders	A dissemination strategy focused to reach the different target groups has been being set up in December 2017. It comprises a roadmap indicating a timeframe with specific regional and European actions. The implementation of this strategy and roadmap is continuously monitored. Directly involved organizations (partners and organizations that are directly involved in the development of the tools and products) support the dissemination activities.	ongoing
Task 8.2 – Project Website	To optimize the effect of the project through dissemination activities by promoting the results and the achievements of the relevant stakeholders	The project website was set up within the first month of the project. The CRAVEzero project website is indicated by domain name: <a href="http://www.cravezero.eu">www.cravezero.eu</a> In the CRAVEzero website, all the main results and achievements are organized in the framework of the pinboard.	ongoing

### 3.ACHIEVED RESULTS OF THE PERIOD

#### RESULT 1 - REFERENCE SCHEMES FOR NZEB URBAN PLANNING AND DESIGN PROCESS

A framework for the development of an effective overall process that covers all stages of the life cycle has been started and a first version of the reference scheme is been tested by the industry partners. It provides professionals with a series of useful information, so a developer can have a clear estimation of the preparation costs and actions to be taken to reach the NZEB standard.

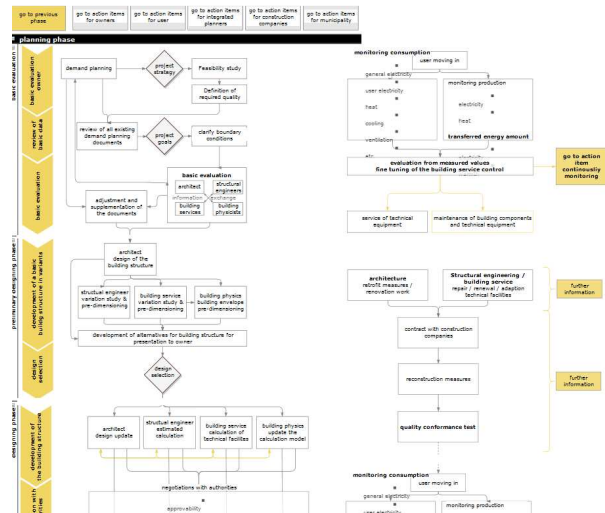


Figure 6: CRAVEzero - Process Map

#### RESULT 3 – DEMONSTRATION OF CO-BENEFITS (MATRIX):

A matrix of possible actions that can be adopted and replicated as a reference structure (process matrix) that is tailored according to local needs and specificities (building requirements). The advantage for the users is that they can be aware starting from the design phase of the reachable targets with the available resources and they can decide the priorities and find out how they can influence the final costs, and this is a point to ensure the user satisfaction. The reachable targets will be reliable since they are assessed through detailed simulations (performed within CRAVEzero project).

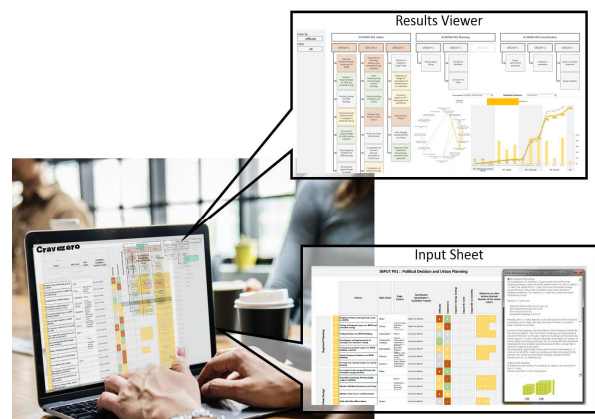


Figure 7: CRAVEzero - Process Matrix

## RESULT 4 –STRUCTURED METHODOLOGICAL APPROACH FOR OPTIMIZING INTEGRATION OF RENEWABLES

Comprehensive solution-sets based on key industrialized components have been collected.

Cost reduction potentials for technologies have been laid down covering the aspects of energy production, energy efficiency and energy use for heating, cooling, and electricity. It is based on the best planning approach using and implementing best cost-effective passive systems for the building envelope, aperture and glazing as well as for the thermal mass requirements.

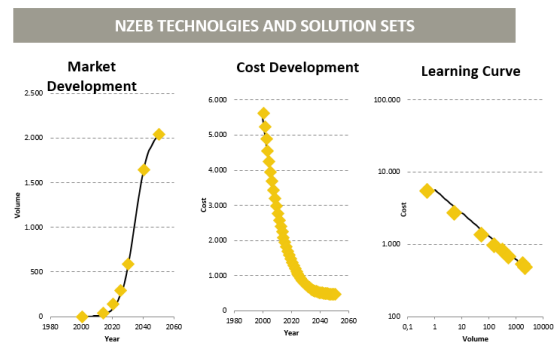


Figure 8: Cost Development of nZEB technologies and renewables

## RESULT 7 – LOW LCC NZEB BUSINESS MODELS:

Canvases of robust business models providing reliable information on for low LCC NZEB have been collected, structured and evaluated. Comprehensive analysis of possible subsidies and financial mechanisms (pros and cons) have been done.

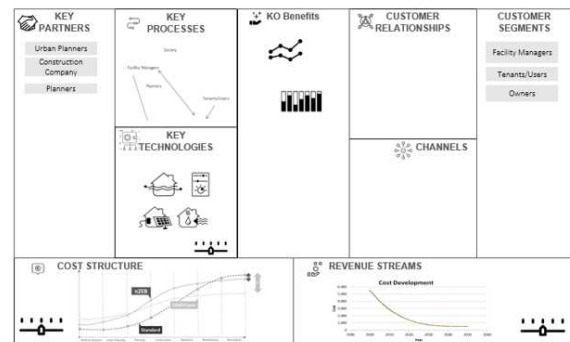


Figure 9: Business Model Evaluation Method

## RESULT 10 – CRAVEZERO PINBOARD AND RELATIVE DEMONSTRATION THROUGH CASE STUDIES.

All the above-reported results will be included in the so-called CRAVEzero pinboard, that will be an interactive support web tool for the most of the involved stakeholders (developer, design team, advisors, general contractor, suppliers/subcontractors, investor, and financier). A base structure for the CRAVEzero pinboard which is a web-based structured framework supporting in developing low LCC NZEB business model, enabling the organization of data and information in a practical, usable and understandable way.

A preview of the structure can be accessed via <http://www.cravezero.eu/thepinboard/>. The web-based pinboard will also allow an easy access to all the CRAVEzero outcomes and all the in-

formation on the supply chain fulfilling the set of requirements in terms of costs and quality and it will be the new mean for implementing new LCC NZEBs.



Figure 10: CRAVEzero Pinboard

## RESULT 10- CASE STUDIES AS BASELINE OF CRAVEZERO OVERALL APPROACH

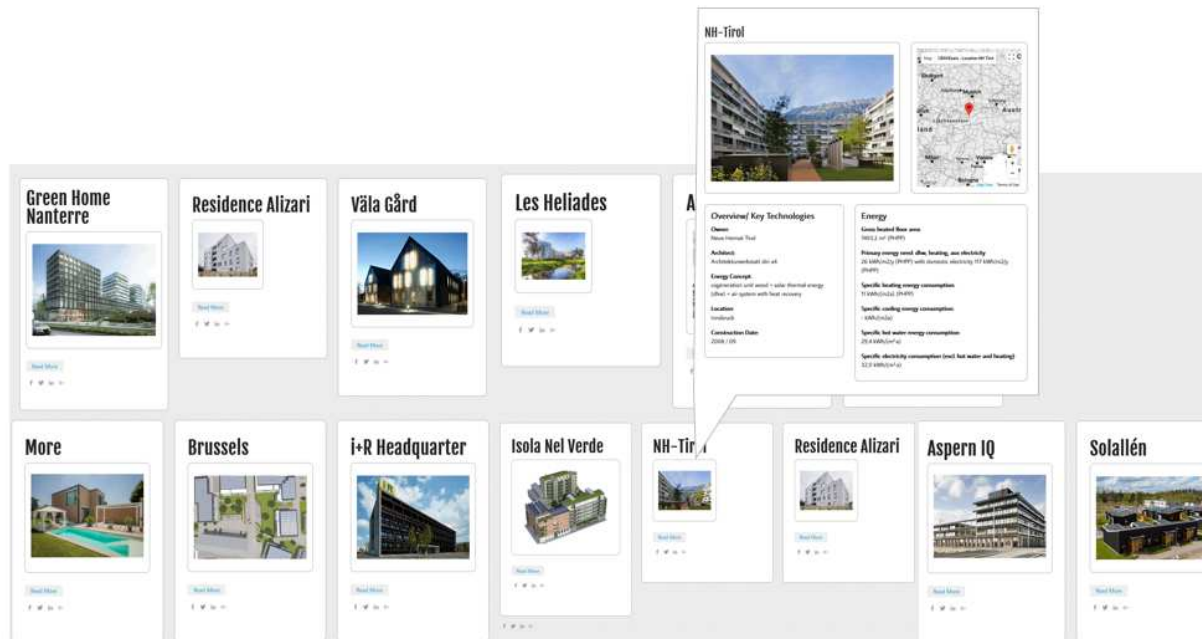


Figure 11: CRAVEzero Case Studies

12 existing reference buildings provided by CRAVEzero industry partners, considered as representative of NZEBs with different functions and context have been analyzed. These case studies include both residential and non-residential buildings. The examined case studies have been scanned to identify the NZEB related cost for the structure, the design, and the construction process and they will be the support to set a baseline of the current costs and performance of NZEBs. All the different costs of the 13 case studies over the given study period with all the potential costs, as adjusted to reflect the time-value of money have been addressed. This method complied with the one described in ISO 15686-5 and with the cost-optimal method recently defined by the EU, which is based on EN 15459. The comparative methodology framework took into account usage patterns, outdoor climate conditions, investment costs, building category, maintenance and operating costs (including energy costs and savings) and earnings from produced energy, where applicable.

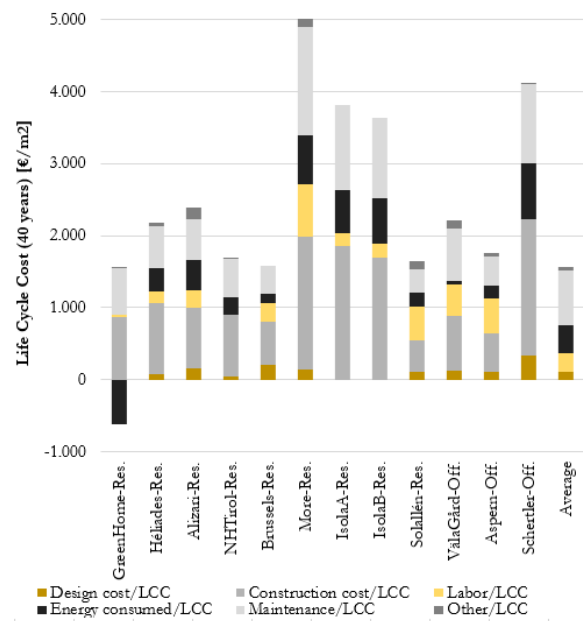


Figure 12: CRAVEZero LCC case study overview

## 4.DELIVERABLES

The project deliverables are progressing well, although there was a short delay of D2.1 “Report on EU implementation of nZEB” (M6) and D5.1 “Typology canvas of business models” (M12).

All other eight promised deliverables could be finalized on time and the milestones have been achieved.

One of the main issues for the delay of deliverable D2.1 was the collection of the information about nZEB standard and uptake across EU. In fact, the data collected from the available sources (i.e. Concerted Action, EU Building Observatory, project ZEBRA 2020), do not provide an updated and comprehensive overview, not even for the countries within the project (Italy, Sweden, France, Austria, Germany). In fact, several documents had not been recently updated, thus further sources of data were under investigation. The deliverable D2.1 then was sent in with two months delay (M8).

For the quantitative and qualitative analysis required in D5.1 there was no comprehensive methodology available. Therefore, a new methodology was developed. The methodology tries to make use of the information, which can be provided in the business model canvas. Developing the methodology and adjusting it to the amount and quality of information provided by partners and found in literature required several iteration loops and adjustment, which took longer than originally planned. However, a consistent and comprehensive methodology is available now. Due to the additional time needed for the development, but also for the several loops needed for data acquisition, the analysis of all collected business models and their detailed description and cross-comparison could not be finalised yet. Therefore, the consortium decided to shift the deadline of deliverable D5.1 for one month to the end of September 2018 in order to guarantee a detailed, high quality and valuable deliverable.

Please see the deliverables electronically collected and enclosed with this report.

*Table 1: List of deliverables*

NO	DELIVERABLE TITLE	WP NO	RESPONSIBLE PARTNER	DUE MONTH	TYPE	ACTUAL DELIVERY DATE
D1.2	Quality and Risk Plan	WP1	1 - AEE-INTEC	4 (Dec 2017)	Report	4 (Dec 2017)
D8.1	Newsletter format	WP8	3 - Fraunhofer	4 (Dec 2017)	Report	4 (Dec 2017)
D8.4	Data base of target group addresses	WP8	3 - Fraunhofer	4 (Dec 2017)	Other	4 (Dec 2017)
D2.1	Report on the EU-implementation of NZEB	WP2	2 - eurac research	6 (Feb 2018)	Report	8 (April 2018)

NO	DELIVERABLE TITLE	WP NO	RESPONSI- BLE PART- NER	DUE MONTH	TYPE	ACTUAL DELIV- ERY DATE
D9.1	H - Requirement No. 1	WP9	1 - AEE INTEC	10 (Jun 2018)	Ethics	10 (Jun 2018)
D1.4	1st Progress Report	WP1	1 – AEE INTEC	12 (Aug 2018)	Report	12 (Aug 2018)
D2.2	Spreadsheet with LCCs - A database for benchmarking actual nZEB life-cycle costs of the case studies	WP2	2 - eurac re- search	12 (Aug 2018)	Report	12 (Aug 2018)
D2.3	Structured repository of existing LCC calculation tool	WP2	2 - eurac re- search	12 (Aug 2018)	Report	12 (Aug 2018)
D4.1	Guideline II: NZEB Technologies: Report on cost reduction potentials for technical NZEB solution sets	WP4	3 - Fraunhofer	12 (Aug 2018)	Report	12 (Aug 2018)
D5.1	Typology canvas of business models	WP5	3 - Fraunhofer	12 (Aug 2018)	Report	Planned - 13 (Sept 2018)



Figure 13: Published Deliverables can be accessed via the CRAVEzero Website - <http://www.cravezero.eu/reports>

## 5.MAIN ACTIVITIES IN THE NEXT PERIOD

The main activities of the next period are in line with Annex 2 of the proposal and the main activities are summarized as follows:

- KPIs for performance-based characterization of NZEBs: list of key performance indicators with assessment procedures and related benchmarks
- Development of a framework for ensuring the process quality of the new NZEBs
  - Development of an optimized urban planning process
  - Development of an optimized integrated building design process
  - Construction process / Development of a nZEB - lean construction management
  - Optimized building operation process
  - Analysis of NZEB possible co-benefits, and identification of relative indicators and parameters: (i) real estate value (ii) living quality (iii) building functionality and architectural value (iv) viability of facility management (v) possible others coming from the analysis of the demo-cases
- Development of a solution matrix for cost savings in NZEB solutions sets with respect to different context, typology (construction concepts, building technical systems including renewables,...).
- Development of innovative business models for NZEBs (e.g. NZEB energy flat rates, flexible feed-in tariffs, new NZEB contracting solutions, “all in” rent, Zero energy cost model, NZEB-public-private-partnership (PPP)) - Development of shared contract models between design / engineering and construction for integrated team processes, and development of collaborating models between private clients and developers or suppliers and use of public-private partnerships. Optimize use of partly outsourcing in design / engineering, and construction. Business models for building up co-operatives to reduce investment costs due to collective purchasing. Coordination issues between several construction companies and/or consultants, especially in case different construction technologies are used within the same neighborhood
- Analysis of the life cycle costs for all parametric models including variations over the whole life cycle of the case studies taking into account both direct and indirect costs. These calculations will incorporate the costs for all processes, solution sets, business models and different stakeholders
  - Definition of parametric models for NZEBs (based on case studies analyzed in WP02) in different climate, urban and energy infrastructure context, to which apply the technologies solution-sets defined in WP04, the business models (WP05) and the processes (WP03).
  - Modeling of reference NZEBs and NZE building clusters with parametric simulations to define constructive and architectural solutions, system layouts and control strategies
  - Sensitivity analyses for all case study to identify the most sensitive parameters influencing results in terms of costs, energy performance and indoor environmental quality.
- Finalisation of the structure of the CRAVEzero pinboard as a reference scheme and structured web environment for developing effective business models for building low LCC NZEB. The organization of all the guidelines with the approaches and methodologies defined within the project as well as the data collected through the analysis of the case studies and the information from the experience of industry partners.

## LIST OF UPCOMING DELIVERABLES UNTIL THE NEXT REPORT:

Table 2: List of upcoming deliverables

NO	DELIVERABLE TITLE	WP NO	RESPONSIBLE PARTNER	DUE MONTH
D2.4	KPIs for performance- based characterisation of NZEB	WP2	2 - EURAC	18
D3.1	Guideline I: NZEB Processes: Report on cost reduction potentials for the whole planning, construction and operation process	WP3	7 - ATP sustain	18
D5.2	Report describing NZEB business models	WP5	3 - Fraunhofer	18
D6.1	Parametric models for buildings and building clusters: building features and boundaries	WP6	1 - AEE INTEC	18
D1.1	Project Management and Activity Report	WP1	1 - AEE INTEC	24
D3.2	Optimized NZEB- process map	WP3	7 - ATP sustain	24
D4.2	Optimized NZEB- solution sets	WP4	3 - Fraunhofer	24
D4.3	Energy flexible building managing models	WP4	3 - Fraunhofer	24
D5.3	Database of all fund services and business models	WP5	3 - Fraunhofer	24
D6.2	Results of optimized NZEB parametric models	WP6	1 - AEE INTEC	24

## PLANNED MEETINGS AND DISSEMINATION IN THE NEXT PERIOD

- Activating website and knowledge exchange thereby attracting more visitors
- Generally, speed up the process of going into public
- Strengthening cooperation with other projects and initiatives
- Strengthen the communication via activities like newsletter, presentations, questionnaires, website activities, events, social media
- Fostering the knowledge of the project through the BUILDUP platform, providing news, links and publications
- Feed national and European NZEB project web-platforms
- Two presentations at the fair BAU 2019 and ISH2019
- Four translated articles in local magazines and on local websites, one per year in each region.
- Two regional symposia
- Dedicated CRAVEzero session and presentations at the ISEC conference 2018 in Austria (international sustainable energy conference)
- Two online training courses (Webinar) of CRAVEzero pinboard
- Bring the industry and national implementation groups together in workshops implementing the CRAVEzero approach
- Conduction of advisory group meeting during 3rd consortium meeting – members already confirmed
- Carry out different questionnaires and interviews within WP8 to gather more information on the frontrunners, financing schemes, and needs of decision makers



## 6. CONSORTIUM MANAGEMENT IN THE PERIOD

The communication between partners runs most often via telephone, e-mail and personal working meetings. Additionally via Skype and WebEx between the regular consortium meetings which were held at:

- 1st project meeting, 13-14th September 2017 in Graz / Austria
- 2nd project meeting, 7-8th March 2018 in Bolzano / Italy

### 6.1. INTERNAL COMMUNICATION

Internal communication was performed through convenient platforms which enable a clear, two-way communication process. The bilateral communication process covered both the information, which needs to be communicated horizontally among all partners and the administrative and strategic information, which is communicated from the coordinator to the partners and discussed at least with the coordinator of each consortium partner.

The internal communication consists of the following tools:

- **Conference and bilateral phone calls:**
  - o Monthly Executive Board Web meetings – AEE INTEC, eurac research, Fraunhofer ISE (Webex conference calls)
  - o Quarterly Consortium Web meetings (every three months)
  - o Work Package (WP) calls (on demand, weekly, monthly)
- **Meetings**
  - o Physical consortium meetings or meetings of working groups twice a year
  - o Online meetings (video, skype or other conferences)
- **Mailing lists**
  - o CRAVEzero Executive Board (AEE INTEC, eurac, ISE)
  - o The general list that includes all the participants involved in the project
  - o Lists for each work package/ task including all contributing partners
- **Web-space**

- o For data exchange and saving project related documents, which should be available for all partners at any time (e.g. agreements and contracts, protocols) a file server is provided. All partners are provided with the login information.

- **Website intranet - Private Members Area**
  - o The project website will include an internal area for members only rated different permission levels. All partners will be provided with a username and password. There is one person from each project partner organization who is responsible for the website-agenda

These tools keep a constant and continuous flow of information between all partners in the CRAVEzero consortium, both on the professional and administrative side. The structure of the internal communication is displayed in Figure 5.

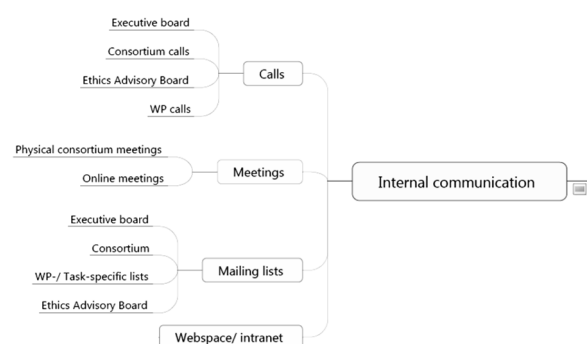


Figure 14: Structure of internal communication

## UPDATED LIST OF PROJECT PARTICIPANTS

Table 3: Updated List of project participants

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–Roberta Pernetti [EURAC] (MAIN CONTRIBUTOR)	–Roberta Pernetti [EURAC] (MAIN CONTRIBUTOR)
–Roberto Lollini [EURAC]	–Klara Meier [ATP] (MAIN CONTRIBUTOR)
–Armin Knotzer [AEE INTEC]	–Björn Berggren [SKA] (MAIN CONTRIBUTOR)
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	–Arnulf Dinkel [ISE]
	–Marine Thouvenot [BOU]
	–Cristina Foletti [MOR]
	–Gabriele Meneguzzi [MOR]
	–Thomas Stöcker [K&M]


–Benjamin Köhler [ISE]
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### WP3 - Cost reduction potentials in processes [ATP/AEE INTEC]

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### WP4 - Cost reduction potentials for NZEB technologies [ISE]

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### WP5 -NZEB Business Models [K&M/ISE]

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### WP6 - Lifecycle cost reduction of new NZEBs [AEE INTEC]

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–Marine Thouvenot [BOU] ( <i>MAIN CONTRIBUTOR</i> )
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–Benjamin Köhler [ISE] ( <i>MAIN CONTRIBUTOR</i> )
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–Arnulf Dinkel [ISE]
–Gabriele Meneguzzi [MOR]
–Thomas Stöcker[K&M]

### WP 7 - Prototypical imp. and CRAVEzero pinboard [EURAC]

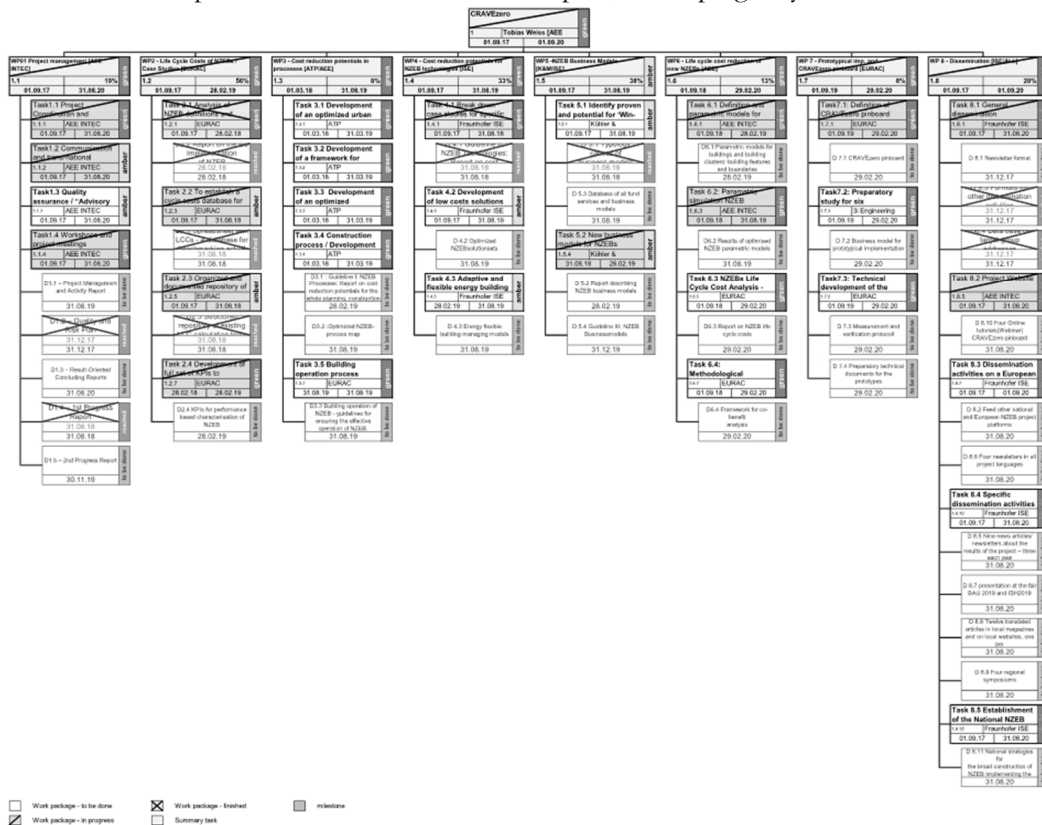
–Roberto Lollini[EURAC] ( <i>MAIN CONTRIBUTOR</i> )
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–Gabriele Meneguzzi [3i]
–Thomas Stöcker[K&M]
–Christoph

### WP 8 - Dissemination [ISE/ALL]

All

## 7.DEVIATIONS FROM ANNEX 1 AND ANNEX 2

By now all deliverables promised by the first period except D5.1 which will be delivered in September were finished and have been uploaded. All other work is in the plan, developing very well and in an interesting way.



## 8.DISSEMINATION AND EXPLOITATION OF RESULTS

### 8.1. WEBSITE – WWW.CRAVEZERO.EU

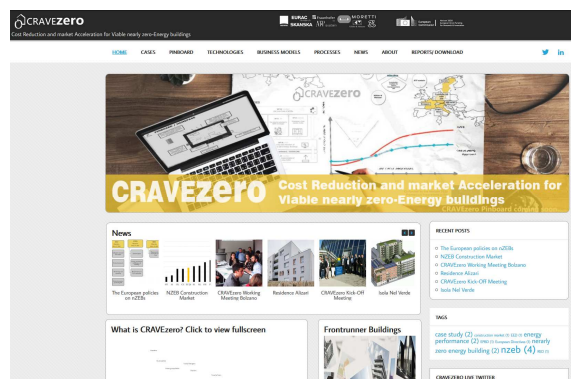


Figure 15: Design layout of the CRAVEzero public website ([www.cravezero.eu](http://www.cravezero.eu))

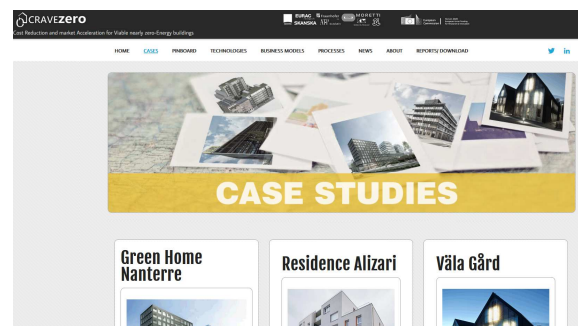


Figure 16: Design layout of the CRAVEzero Case Study Section (<http://www.cravezero.eu/cases>)



Figure 17: Design layout of the CRAVEzero Case Study Data Explorer - Part of Pinboard  
(<http://www.cravezero.eu/cases/case-study-data-explorer/>)

The project website was set up within the first month of the project.

The CRAVEzero project website is indicated by domain name: [www.cravezero.eu](http://www.cravezero.eu) and is structured as follows:

#### EXTERNAL/ Public Area

- Frontrunners / Case studies
- Technologies

## 8.2. SOCIAL MEDIA



Figure 18: @CRAVEzeroEU Twitter Account

- Business models
- Processes
- About the project/ Contact
- Recent posts + News
- Pinboard
- Reports

#### INTERNAL/ Private Members Area:

- Area accessible only by partners/ EASME, structured according to particular work packages, covering relevant information, deliverables documents, outputs, results.

The website is used as:

- a communication and dissemination channel for the project's results and achievements
- the main interface towards the target groups
- a share point for the consortium, containing all institutional information, including working documents and deliverables.

A social media account on Twitter - @CRAVEzeroEU was created for the project in order to promote the activities of the CRAVEzero project and the pinboard. It is used for informing followers about events, in which the project partners present the project and its results. In addition, the publication of deliverables and articles is announced there. The twitter account was also integrated into the website.

In order to assure a wide reach, all partners share news published on LinkedIn and tweets on Twitter using the hashtags #cravezero and #nZEB. Therefore, one person from each consortium partner was appointed to support the social media activities and to assure that news is shared and re-tweeted via the official channels of each partner.

### 8.3. OTHER COMMUNICATION AND DISSEMINATION CHANNELS

Besides the described channels, the project is promoted and communicated via additional channels.

Furthermore, partners were asked to develop “project sites” on their company’s websites.

Fraunhofer ISE: <https://www.ise.fraunhofer.de/en/research-projects/cravezero.html>)

AEE - INTEC: [http://AEE - INTEC-intec.at/index.php?seitenName=projekteDetail&projekteId=214](http://AEE-INTEC-intec.at/index.php?seitenName=projekteDetail&projekteId=214)).

EURAC: <http://www.eurac.edu/en/research/technologies/renewableenergy/projects/Pages/default.aspx>

In addition to the described channels, the consortium will write contributions for the Fraunhofer ISE blog “Innovation 4 E available under [www.innovation4e.de](http://www.innovation4e.de).

### 8.4. PUBLICATIONS

Table 4: List of publications, articles, and journals

NO.	PUBLICATION FORMAT	TITLE	PARTNER	YEAR	REGION
1	Build Up - The European portal for energy efficiency in buildings <a href="http://www.buildup.eu/en/practices/publications/report-eu-implementation-nZEBs">http://www.buildup.eu/en/practices/publications/report-eu-implementation-nZEBs</a>	Cost reduction of new Nearly Zero-Energy Buildings: which projects are in the pipeline?	AEE INTEC	2017	AT (Central Europe)
2	Article: nachhaltige technologien 2017/3, page 29	CRAVEzero – Kostenreduktion und Beschleunigter Markteintritt für Nearly Zero Energy Buildings	AEE INTEC	2017	AT (Central Europe)
3	Accepted Paper: ISEC Conference	Evaluation of Business Models for the Large-Scale Implementation of Nearly Zero-Energy Buildings in Europe	ISE/ eurac		(Europe)
4	Accepted Paper: ISEC Conference	LCC Analysis of a Swedish Net Zero Energy Building – Optimising LCC Including Co-Benefits	Skanska/ eurac / AEE INTEC	2018	(Europe)
5	Build Up - The European portal for energy efficiency in buildings <a href="http://www.buildup.eu/en/practices/publications/report-eu-implementation-nZEBs">http://www.buildup.eu/en/practices/publications/report-eu-implementation-nZEBs</a>	Report on EU implementation of nZEBs	eurac	2018	(Europe)

## 9. USE OF RESOURCES

All partners were asked to evaluate the hours and resources spent compared to the initial work plan and its initial allocation. By now no deviations have been identified and no unforeseen expenses came up. Also, travels are by now covered within the project budget.

	WP TITLE	WP LEAD	AEE - INTEC	FRAUNHOFER ISE	EURAC	BOUYGUES	SKANSKA	ATP	KÖHLER & MEINZER	MORETTI	3I ENGINEERING	TOTAL PERSON MONTHS
WP 01	Project management	AEE - INTEC	3,73	1,10	0,33	0,47	0,00	0,00	0,00	0,49	0,00	6,12
WP 02	Definition NZEB / LCC	EURAC	1,68	1,20	9,73	2,49	1,10	1,49	2,36	1,49	0,75	22,29
WP 03	Cost reduction potentials in planning processes	ATP / AEE - INTEC	4,48	0,60	1,72	0,13	0,60	2,15	0,29	0,14	0,30	10,41
WP 04	Cost reduction potentials for NZEB technologies	Fraunhofer ISE	1,46	8,60	1,70	0,11	0,50	0,35	0,00	0,16	0,30	13,18
WP 05	New business models	Fraunhofer ISE	0,41	2,80	1,06	0,33	0,00	0,48	1,60	0,59	0,17	7,44
WP 06	Life cycle cost reduction	AEE - INTEC	2,34	0,00	0,59	0,00	0,00	0,00	0,00	0,00	0,00	2,93
WP 07	Prototypical Implementation	EURAC	0,26	0,00	0,17	0,00	0,00	0,20	0,00	0,00	0,00	0,63
WP 08	Dissemination	Fraunhofer ISE	0,83	0,40	0,68	0,00	0,00	0,18	0,00	0,00	0,00	2,09
<b>Total Person Months per Participant</b>			<b>15,2</b>	<b>14,7</b>	<b>15,98</b>	<b>3,53</b>	<b>2,20</b>	<b>4,85</b>	<b>4,25</b>	<b>2,87</b>	<b>1,52</b>	<b>65,10</b>

## 10. GENDER

Gender of researchers and other workforce that have been involved in the first year of the project

NUMBER WOMEN RESEARCHERS (ALL LEVELS, INCL. POSTDOCS, AND PH.D. STUDENTS)	NUMBER MEN RESEARCHERS (ALL LEVELS, INCL. POSTDOCS, AND PH.D. STUDENTS)	NUMBER WOMEN IN THE WORKFORCE OTHER THAN RESEARCHERS	NUMBER MEN IN THE WORKFORCE OTHER THAN RESEARCHERS
[9]	[18]	[8]	[2]

# 11. APPENDIX A – ACTION ITEMS DONE IN THE FIRST YEAR

WORK PACKAGE	DESCRIPTION	RESPONSIBILITY	DATES	STATUS
1.1.1 - Task1.1 Project Coordination and Resource Monitoring	The organisation of Kick-Off Meeting Meeting Minutes	Tobias Weiß	13.09.17	solved
1.1.1 - Task1.1 Project Coordination and Resource Monitoring	Kick-Off Meeting Agenda	Tobias Weiß	24.08.17	solved
1.2.4 - D2.1 Spreadsheet with LCCs - A database for benchmarking actual NZEB life-cycle costs of the case studies	order English PHPP Licences	Bouygues, Skanska, ATP, Köhler & Meinzer, Moretti	21.09.17	solved
1.1.1 - Task1.1 Project Coordination and Resource Monitoring	CRAVEzero Website / Webspace	Tobias Weiß	30.09.17	solved
1.1.1 - Task1.1 Project Coordination and Resource Monitoring	Introduction of partners (Presentation template)	All	13.09.17	solved
1.6.1 - Task 6.1 Definition and parametric models for NZEBs.	Presentation of Case Studies	Bouygues, Skanska, ATP, Köhler & Meinzer, Moretti	13.09.17	solved
1.7.2 - D 7.1 CRAVEzero pinboard	Pinboard Layout+Structure Ideas for Kick-Off	Tobias Weiß	13.09.17	solved
1.2.4 - D2.1 Spreadsheet with LCCs - A database for benchmarking actual NZEB life-cycle costs of the case studies	LCA Cost Template CRAVE Zero/ Framework for Data collection	Roberta Perneti		in progress
1.2.4 - D2.1 Spreadsheet with LCCs - A database for benchmarking actual NZEB life cycle costs of the case studies	PHPP Spreadsheet Case Studies	Klara Meier, Marine Thovenot, Gabriele Meneguzzi, Thomas Stöckler, Björn Berggren	31.10.17	solved
1.4.1 - Task 4.1 Break down case studies for specific technologies, renewable energy systems	Prepare repository technology sets	Benjamin Köhler	31.01.18	solved
1.4.1 - Task 4.1 Break down case studies for specific technologies, renewable energy systems	Validate repository structure	Klara Meier, Marine Thovenot, Gabriele Meneguzzi, Thomas Stöckler, Björn Berggren	28.02.18	solved
1.2.4 - D2.1 Spreadsheet with LCCs - A database for benchmarking actual NZEB life cycle costs of the case studies	Fill-in repository (including cost) / LCA Cost Template CRAVE Zero	Klara Meier, Marine Thovenot, Gabriele Meneguzzi, Thomas Stöckler, Björn Berggren	28.02.18	solved
1.4.1 - Task 4.1 Break down case studies for specific technologies, renewable energy systems	Method to identify cost reduction potentials	Benjamin Köhler	28.02.18	solved
1.4.1 - Task 4.1 Break down case studies for specific technologies, renewable energy systems	Validatate and apply method to identify cost reduction potentials	Klara Meier, Marine Thovenot, Gabriele Meneguzzi, Thomas Stöckler, Björn Berggren		in progress
1.1.1 - Task1.1 Project Coordination and Resource Monitoring	REPORTING METHOD	Tobias Weiß	30.09.17	solved
1.1.1 - Task1.1 Project Coordination and Resource Monitoring	Payment request and bank details	All	30.11.17	solved



1.2.1 - Task 2.1 Analysis of NZEB definitions and relative KPIs as implemented in different EU countries.	To identify all the possible sources of data. Inputs from all the partners involved	Roberta Perneti	19.01.18	solved
1.2.1 - Task 2.1 Analysis of NZEB definitions and relative KPIs as implemented in different EU countries.	To collect the agreed data in the selected relevant EU countries	Roberta Perneti	31.12.17	solved
1.2.1 - Task 2.1 Analysis of NZEB definitions and relative KPIs as implemented in different EU countries.	To organise the data in a shared database	Roberta Perneti	30.01.18	solved
1.2.1 - Task 2.1 Analysis of NZEB definitions and relative KPIs as implemented in different EU countries.	To prepare the report for the deliverable	Roberta Perneti	28.02.18	solved
1.2.3 - Task 2.2 To establish a cycle costs database for state of the art NZEBs	To investigate further sources of data	Roberta Perneti		in progress
1.2.3 - Task 2.2 To establish a cycle costs database for state of the art NZEBs	To analyse and organise the collected data	Roberta Perneti	02.03.18	solved
1.2.5 - Task 2.3 Organized and documented repository of LCC tools to support NZEBs design	Definition of the list of features to be analysed for the LCC tools	Roberta Perneti	23.02.18	solved
1.2.5 - Task 2.3 Organized and documented repository of LCC tools to support NZEBs design	Collect the available tools and analysing their potentials & weaknesses	Roberta Perneti	30.03.18	in progress
1.2.5 - Task 2.3 Organized and documented repository of LCC tools to support NZEBs design	Comparing the results obtained with different tools for the evaluation of one (or more case studies)	Roberta Perneti		to be done
1.3.4 - Task 3.4 Construction process / Development of a NZEB - lean construction management	First release of the KPI list	Roberta Perneti	30.03.18	solved
1.5.1 - Task 5.1 Identify proven and potential for 'Win-win-win' sustainable business for all involved stakeholders according to the process	Method to describe and validate business models	Arnulf Dinkel	28.02.18	solved
1.5.1 - Task 5.1 Identify proven and potential for 'Win-win-win' sustainable business for all involved stakeholders according to the process	Discuss and validate method to describe and validate business models	All Task Members	31.03.18	solved
1.5.1 - Task 5.1 Identify proven and potential for 'Win-win-win' sustainable business for all involved stakeholders according to the process	Describe your existent business models	All Task Members	31.03.18	solved
1.5.1 - Task 5.1 Identify proven and potential for 'Win-win-win' sustainable business for all involved stakeholders according to the process	Repository of business models	Arnulf Dinkel	31.03.18	solved
1.5.1 - Task 5.1 Identify proven and potential for 'Win-win-win' sustainable business for all involved stakeholders according to the process	Discuss and validate the models / Discuss their market uptake potential per country/per region	All Task Members	30.04.18	solved
1.8.1 - Task 8.1 General dissemination management activities	Setup dissemination strategy/plan Setup newsletter format	Arnulf Dinkel / Benjamin Köhler / Tobias Weiß	23.12.17	solved
1.8.1 - Task 8.1 General dissemination management activities	First newsletter	Arnulf Dinkel / Benjamin Köhler / Tobias Weiß		planned
1.7.2 - D 7.1 CRAVEzero pinboard	Development of CRAVEzero interactive Pinboard	Tobias Weiß		in progress
1.2.3 - Task 2.2 To establish a cycle costs database for state of the art NZEBs	PHPP Workshop for industry partners	Tobias Weiß		solved

1.6.2 - D6.1 Parametric models for buildings and building clusters: building features and boundaries	Letter of approval for building owners	Tobias Weiß	30.09.17	solved
1.6.1 - Task 6.1 Definition and parametric models for NZEBs.	Presentation of NEW Case Studies	Klara Meier, Marine Thovenot	26.12.17	solved
1.8.5 - Task 8.2 Project Website	Social Media Activities - Workshop	Tobias Weiß	31.01.18	solved
1.6.2 - D6.1 Parametric models for buildings and building clusters: building features and boundaries	Feedback on PHPP Spreadsheets to Industry Partners	David Venus	31.12.17	solved
1.6.2 - D6.1 Parametric models for buildings and building clusters: building features and boundaries	Parametric Simulation of Case Study I (Test)	Tobias Weiß, Marine Thouvenot	30.09.18	planned
1.1.1 - Task1.1 Project Coordination and Resource Monitoring	Deliverable - Template will be adopted by Tobias (Correct Numbers / Bullet Points, too many pages in the front, ICON Issue - Credits)	Tobias Weiss [AEE - INTEC]		solved
1.1.1 - Task1.1 Project Coordination and Resource Monitoring	Cloud Server ISE for CRAVEzero? (AI: Benjamin till beginning of Feb., Link will be sent out by Benjamin early next year to EURAC, AEE - INTEC)	Benajmin	23.12.17	solved
1.1.1 - Task1.1 Project Coordination and Resource Monitoring	Next Meeting Bolzano, Travel information e.g. send out to Partner (AI: Roberta till X-Mas)	Roberta		solved
1.3.6 - D3.2 :Optimized NZEB- process map	Give feedback to "Process Map=Draw.io-Flowchart (responsible Klara)	All WP03 core group members to Klara	27.04.18	solved
1.3.6 - D3.2 :Optimized NZEB- process map	Feedback to the Process Actions of each single life cycle phase of the NZEB-LifeCycle Process Map based on own experiences in e.g. case study buildings	All to Klara/ Tobias/ Armin	31.03.18	solved
1.3.6 - D3.2 :Optimized NZEB- process map	Process Visualisation based on Klaras Template your own countries' or case studies' experience	All	30.04.18	solved
1.3.6 - D3.2 :Optimized NZEB- process map	Survey on the potential of each single Process Action to change costs/CO2/ energy demand etc.	All Task Members	16.05.18	solved
1.3.6 - D3.2 :Optimized NZEB- process map	Investigation and summary on studies and literature regarding NZEB-LifeCycle process	Armin	31.08.18	planned
1.4.2 - D 4.1 Guideline II: NZEB Technologies: Report on cost reduction potentials for technical NZEB solution sets	Cross-comparison installed technologies in case studies (tech. & cost parameters)	Benjamin	31.03.18	solved
1.4.2 - D 4.1 Guideline II: NZEB Technologies: Report on cost reduction potentials for technical NZEB solution sets	Comparison with additional data from literature	Benjamin, All	30.04.18	in progress

1.4.2 - D 4.1 Guideline II: NZEB Technologies: Report on cost reduction potentials for technical NZEB solution sets	Apply Method cost reduction potentials	Benjamin	30.06.18	in progress
1.4.2 - D 4.1 Guideline II: NZEB Technologies: Report on cost reduction potentials for technical NZEB solution sets	D 4.1: Guideline II: NZEB Technologies: Report on cost reduction potentials	Benjamin	31.08.18	to be done
1.5.2 - D 5.1 Typology canvas of business models	Fill in Canvas for Case studies and additional “lighthouse” projects from your country	All Task Members	31.03.18	solved
1.5.2 - D 5.1 Typology canvas of business models	Analysis and cross comparison of business models	Benjamin	30.04.18	solved
1.5.2 - D 5.1 Typology canvas of business models	Development and application of business model assessment tool	Arnulf	16.05.18	in progress
1.5.2 - D 5.1 Typology canvas of business models	Validation of assessment tool	All Task members	31.05.18	in progress
1.5.2 - D 5.1 Typology canvas of business models	Evaluation/ Ranking of business models	Arnulf	30.06.18	in progress
1.5.2 - D 5.1 Typology canvas of business models	D5.1: Typology canvas of business models	Benjamin	31.08.18	to be done
1.1.1 - Task1.1 Project Coordination and Resource Monitoring	D9.1 H- Requirement No. 1	Tobias	30.06.18	solved
1.1.1 - Task1.1 Project Coordination and Resource Monitoring	D1.4 – 1st Progress Report	Tobias	31.08.18	to be done
1.2.1 - Task 2.1 Analysis of NZEB definitions and relative KPIs as implemented in different EU countries.	To prepare the report for the deliverable	Roberta Perneti	30.04.18	solved
1.2.1 - Task 2.1 Analysis of NZEB definitions and relative KPIs as implemented in different EU countries.	To finalise the simulation activity for the reference building and define the normalisation approach to compare the results across CRAVEZero	eurac	23.03.18	solved
1.2.1 - Task 2.1 Analysis of NZEB definitions and relative KPIs as implemented in different EU countries.	Review of the analysis from country experts	Industry partners	29.03.18	solved
1.2.1 - Task 2.1 Analysis of NZEB definitions and relative KPIs as implemented in different EU countries.	To organise the data in a shared framework	eurac	15.04.18	solved
1.2.1 - Task 2.1 Analysis of NZEB definitions and relative KPIs as implemented in different EU countries.	To prepare the deliverable	eurac	15.04.18	solved
1.2.1 - Task 2.1 Analysis of NZEB definitions and relative KPIs as implemented in different EU countries.	To fine-tune the data collection template according to the feedback received during the project meeting, the selected indicators and according to WP6.	AEE - INTEC + eurac	30.03.18	in progress
1.2.1 - Task 2.1 Analysis of NZEB definitions and relative KPIs as implemented in different EU countries.	To collect the cost data from the case study partners	Industry partners	30.05.18	in progress

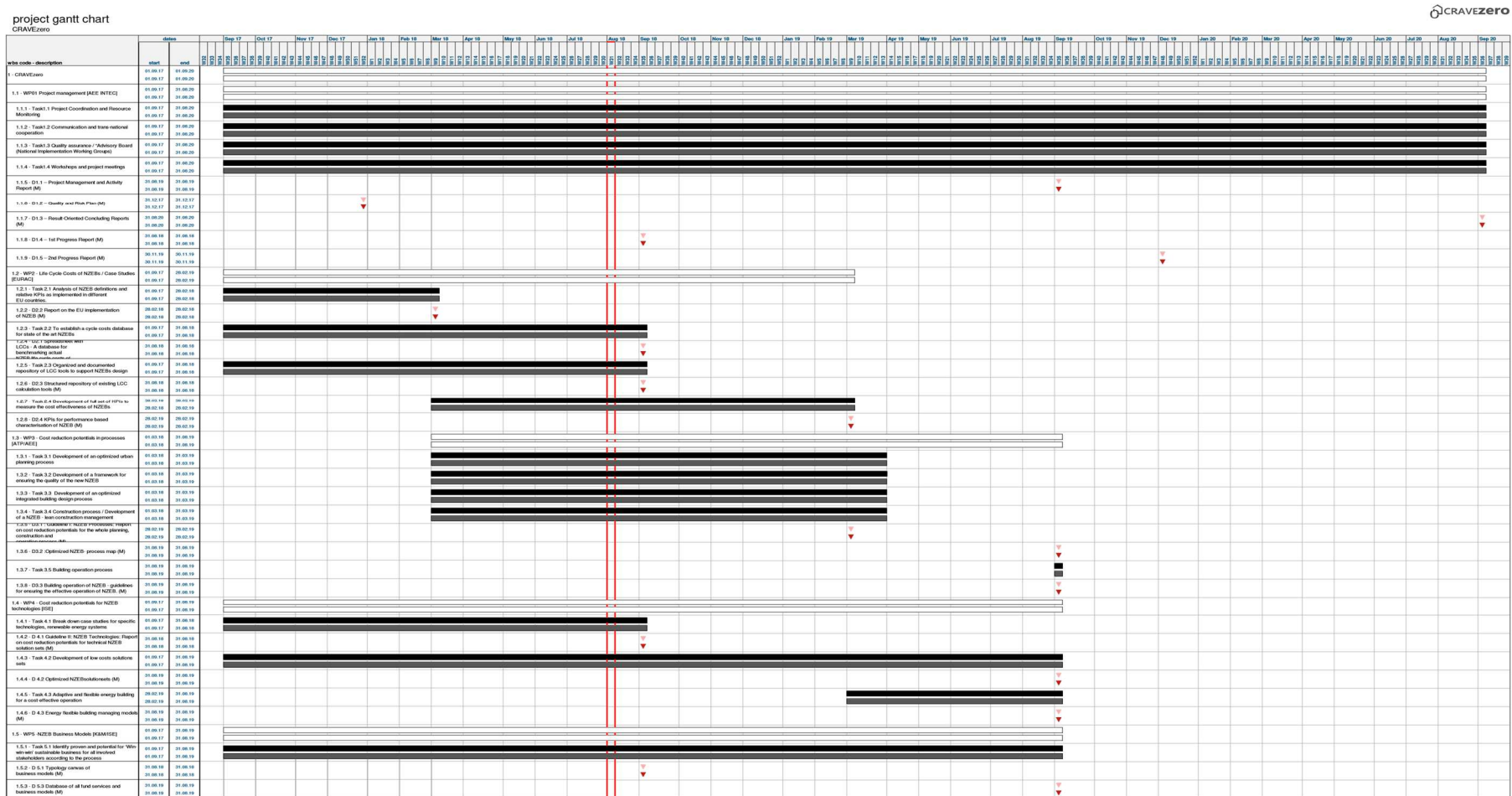
1.2.1 - Task 2.1 Analysis of NZEB definitions and relative KPIs as implemented in different EU countries.	Implementation of the calculations in the LCC spreadsheet	eurac	15.06.18	solved
1.2.1 - Task 2.1 Analysis of NZEB definitions and relative KPIs as implemented in different EU countries.	To agree on the approach to complete the missing information (maintenance, labour, etc.) and for normalisation	eurac, AEE - INTEC, ISE	30.05.18	in progress
1.2.1 - Task 2.1 Analysis of NZEB definitions and relative KPIs as implemented in different EU countries.	Feedback – review loop	eurac + industry partners	01.07.18	in progress
1.2.1 - Task 2.1 Analysis of NZEB definitions and relative KPIs as implemented in different EU countries.	Preparation of the deliverable	eurac	15.08.18	planned
1.2.5 - Task 2.3 Organized and documented repository of LCC tools to support NZEBs design	To fine-tune the framework for analysing the tools	eurac	15.04.18	solved
1.2.5 - Task 2.3 Organized and documented repository of LCC tools to support NZEBs design	Finalise the selection of tools to be analysed	eurac + all partners	30.05.18	in progress
1.2.5 - Task 2.3 Organized and documented repository of LCC tools to support NZEBs design	Preparation of the deliverable	eurac	15.08.18	planned
1.2.7 - Task 2.4 Development of full set of KPIs to measure the cost effectiveness of NZEBs	To draft the list of LCC indicators to be evaluated	eurac + AEE - INTEC	22.03.18	solved
1.3.6 - D3.2 :Optimized NZEB- process map	Give feedback to “Process Matrix=Excel” (responsible Tobias)	All WP03 core group members to Tobias	27.04.18	solved
1.3.6 - D3.2 :Optimized NZEB- process map	Detailed (but short) description of the actions in the “Process Matrix” assigned to you – see list below (responsible Armin) till 31.05.2017	All WP03 core group members to Armin	31.05.18	In Progress
1.3.6 - D3.2 :Optimized NZEB- process map	Individual Description or Process Map for your country (responsible Klara) in the report template	All WP03 core group members to Klara	31.05.18	to be done
1.3.6 - D3.2 :Optimized NZEB- process map	Preparation of Report Template including Names and Responsibilities	Tobias	31.05.18	OK
1.3.6 - D3.2 :Optimized NZEB- process map	Process Matrix=Excel 2.0 – Tool Development + Website Integration	Tobias, Daniel	30.06.18	In Progress
1.3.6 - D3.2 :Optimized NZEB- process map	New Action: Process Matrix Tool needs to be filled out for all the members of the Consortium	All	31.07.18	to be done
1.3.6 - D3.2 :Optimized NZEB- process map	Survey Tool on cost reduction in processes (EURAC) till?www.menti.com	EURAC, Björn	till September 2018	planned
1.2.5 - Task 2.3 Organized and documented repository of LCC tools to support NZEBs design	To agree on the approach to complete the missing information (maintenance,	eurac, AEE - INTEC, ISE	30.05.18	In Progress

labour, etc.) and for  
normalisation

1.2.5 - Task 2.3 Organized and documented repository of LCC tools to support NZEBs design	Feedback – review loop	eurac + industry partners	01.07.18	In Progress
1.2.5 - Task 2.3 Organized and documented repository of LCC tools to support NZEBs design	Coordination with AEE - INTEC-INTEC for the development of the LCC tool according to WP6	eurac, AEE - INTEC	15.07.18	In Progress
1.2.5 - Task 2.3 Organized and documented repository of LCC tools to support NZEBs design	Preparation of the deliverable	eurac	15.08.18	In Progress
1.2.5 - Task 2.3 Organized and documented repository of LCC tools to support NZEBs design	Inputs from the partners	ATP+AEE - INTEC	15.07.18	In Progress
1.2.5 - Task 2.3 Organized and documented repository of LCC tools to support NZEBs design	Preparation of the deliverable	eurac	15.08.18	In Progress
1.2.7 - Task 2.4 Development of full set of KPIs to measure the cost effectiveness of NZEBs	Test of the indicators on the LCC	eurac	30.07.18	In Progress
1.4.2 - D 4.1 Guideline II: NZEB Technologies: Report on cost reduction potentials for technical NZEB solution sets	Cross-comparison installed technologies in case studies (tech. & cost parameters)	ISE	31.07.18	In Progress
1.4.2 - D 4.1 Guideline II: NZEB Technologies: Report on cost reduction potentials for technical NZEB solution sets	Comparison with additional data from literature	ISE	31.07.18	In Progress
1.4.2 - D 4.1 Guideline II: NZEB Technologies: Report on cost reduction potentials for technical NZEB solution sets	Collection of additional (national) data from partners à Status partners?	ISE	30.06.18	In Progress
1.4.2 - D 4.1 Guideline II: NZEB Technologies: Report on cost reduction potentials for technical NZEB solution sets	Apply Method cost reduction potentials	ISE	31.07.18	In Progress
1.4.2 - D 4.1 Guideline II: NZEB Technologies: Report on cost reduction potentials for technical NZEB solution sets	D 4.1: Guideline II: NZEB Technologies: Report on cost reduction potentials	ISE	31.08.18	In Progress
1.5.2 - D 5.1 Typology canvas of business models	D5.1: Report „Typology canvas of business models“	ISE	Aug 18	In Progress
1.5.2 - D 5.1 Typology canvas of business models	D5.2: Database of all found services and business models	ISE	Aug 18	In Progress
1.5.2 - D 5.1 Typology canvas of business models	partners give indication of additional BM	ISE	ASAP	In Progress
1.5.2 - D 5.1 Typology canvas of business models	Partners cross-check some BM give comments	ISE	July 18	In Progress
1.5.2 - D 5.1 Typology canvas of business models	We will prepare some cost and revenue numbers for some BM -> partners give comments	ISE	July 18	In Progress

# 12. APPENDIX B - PROGRESS OF WORK PLAN IN THE PERIOD

project gantt chart  
CRAVEzero



The diagram shows a horizontal bar divided into two equal halves. The left half is dark blue and labeled 'Summary task'. The right half is light green and labeled 'work package'. Below the bar, there are two red triangles pointing upwards. The first triangle is positioned under the boundary between the dark blue and light green sections and is labeled 'milestone'.