



Total Renovation Strategies for Energy Reduction in Public Building Stock

Deliverable

WP 1, T 1.1

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Integration of technologies for energy-efficient solutions in the
renovation of public buildings

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Work Package	WP 1 – Project Management
Task	T 1.1 – Overall coordination
Partner	ACCIONA

Versions

Version	Person	Partner	Date
1	Juan Cuevas (PC)	ACC	November 17, 2015
2	Juan Cuevas (PC) Feedback from PTA implemented	ACC	December 28, 2015



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1 Project objectives for the Period.

1.1 Introduction.

In year 2, there is a clear challenge listed in the Work Plan; the research activities of Work Packages 2 and 3 shall be accomplished, while Works Package 4 dealing with integration and Work Package 5 devoted to demonstration, shall already have a consistent amount of work in place.

According to the Gantt Chart, which is presented ion the following section, there is a report overlapping related to this document, which covers months 13 to 24, while there is a First Periodic Report for the European Commission, covering months 1 to 18 and Second Periodic Report which will cover months 25 to 36. All in all, this document is intended to contain a synthetic description of the progress achieved in each task, leaving the detailed technical descriptions and the proper work presentation for the deliverables.

So, from now on, reports like this, coming from the Management Work Package, will aim to be clear, synthetic and concise, showing the achieved and the delays, if any.



1.2 General overview at the use of the Gantt Chart.

BRICKER GANTT CHART		YEAR 1				YEAR 2				YEAR 3				YEAR 4															
		2	4	6	8	10	12	14	16	18	20	22	24	26	28	30	32	34	36	38	40	42	44	46	48				
WP1	PROJECT MANAGEMENT																												
Task 1.1.	Governance structure, communication flows and methods.	2D																											
Task 1.2.	Overall coordination .					D								D				D											
WP2	ENVELOPE RETROFITTING SOLUTIONS FOR DEMAND REDUCTION																												
Task 2.1.	Design and development of a sustainable and light weight ventilated façade.			D																									
Task 2.2.	Development of novel insulation materials with embeded PCMs to improve thermal inertia of the building envelope.			D																									
Task 2.3.	Development of smart and high performance aerating windows.					D																							
WP3	ZERO EMISSIONS ENERGY PRODUCTION TECHNOLOGIES																												
Task 3.1.	Technical requirements and specifications of the Cogeneration prototype and its components.	D																											
Task 3.2.	Design, construction, test and optimization of the Cogeneration prototypes.					D D D																							
Task 3.3.	Design and construction of the new collector fields for easy roof installation and operation at temperatures up to 300°C.					D																							
Task 3.4.	Development of optimized structures to connect and integrate the solar collectors structure in different building roof configurations.					D																							
Task 3.5.	Control and hydraulic systems of the solar field adaptation to provide optimal temperature and flow conditions to the system.					D																							
Task 3.6.	Biomass plant requirements and specific design to work as hybrid system for the cogeneration prototypes.					D																							
Task 3.7.	Chiller plants requirements and specific design to work in tri-generation mode with the Cogeneration prototypes.					D																							
WP4	BRICKER TECHNOLOGIES' IMPLEMENTATION IN BUILDINGS, GUIDANCE FOR IMPLEMENTATION AND TECHNOLOGICAL TRANSFER																												
Task 4.1.	Concept design, model design and simulation of the BRICKER technologies in different scenarios.			D																									
Task 4.2.	Optimal Active Systems integration project in the buildings.									D																			
Task 4.3.	Optimal Passive Systems integration project in the buildings.									D																			
Task 4.4.	Development of the operation strategies for the Active technologies									D																			
Task 4.5.	Guides for design, commissioning and maintenance.																	D											
Task 4.6.	BRICKER Concept transfer to Social Housing.																	D											
WP5	DEMONSTRATION AND EVALUATION IN THREE EXISTING PUBLIC BUILDINGS IN EUROPE																												
Task 5.1.	Monitoring and performance evaluation of the buildings before renovation.					MONITORING				D																			
Task 5.2.	Manufacturing of the solutions to be installed in the demonstration buildings.									D																			
Task 5.3.	Installation, commissioning and start-up in the 3 demo buildings.									D				D															
Task 5.4.	Monitoring and performance evaluation of the buildings after the renovation.													MONITORING				D											
Task 5.5.	Economic analysis of the 3 demo site implementations.																	D											
WP6	EXPLOITATION AND REPLICATION																												
Task 6.1.	Exploitation.													D				D											
Task 6.2.	Business model and business plans for each of the key results.													D				D											
Task 6.3.	Replication.													D				D											
WP7	DISSEMINATION AND COMMUNICATION																												
Task 7.1.	Dissemination and Communication Secretariat build up and operation.	D																											
Task 7.2.	Project website.	D																											
Task 7.3.	Dissemination and Communication Plan.	D		D		D		D		D		D		D		D		D		D		D		D					
		Milestones (months)																											
		6		12		18		24		30		36		42		48													
		1		1st Period				18				19				2nd Period				36				3rd Period				48	
		D=Deliverable/s																											
		D=New Deliverable/s																											
		Extended/modified activities																											



2 Work Package 2 Progress: Envelope retrofitting solutions for demand reduction (ACCIONA).

General status Table, where progress in months 13 to 24 is listed;

Task 2.1	Planned	Achieved	Deliverables
Design and development of a sustainable and light weight ventilated façade	100%	100%	D.2.8. at M18
Works in the second year			
<ul style="list-style-type: none"> Finalising the manufacturing of the cladding panels, by ACCIONA. Quality control definition, implementation and validation, by ACCIONA. Report preparation and tender information transfer to the Turkish team. Organisation of the shipping of the façade components from ACCIONA premises to the Turkish demonstration Hospital. TO AMEND THE GA: Transfer of 10k€ from “subcontracting” from ACCIONA to ADU, to pay the transport of the façade components. 			
Task 2.2	Planned	Achieved	Deliverables
Development of novel materials with embedded PCM to improves building thermal insulation	100%	100%	D.2.9. at M18
Works in the second year			
<p>SOLUTION 1: PIR + PCM sandwich panel for Block 1 – 610 m2 for INSIDE ceiling insulation, highest floor, thickness 13cm.</p> <ul style="list-style-type: none"> The final solution for the PCM integration has been defined. The Production process suffers some delays and material waste due to the PIR and PCM physical properties. Single Burning Item (SBI) test EN 13823- in progress. <p>SOLUTION 2: Classic PIR foam Block 6 – 648 m2 OUTSIDE roof insulation, thickness 12 cm</p> <ul style="list-style-type: none"> The sandwich solution is tested; mechanical and fire resistance. The manufacturing of the PIR foam panels for the façades and the roof of block 1 (without PCM) starts and will continue until month 27, when the building owner is expecting the material to arrive to their premises. 			



Task 2.3	Planned	Achieved	Deliverables
Development of smart and high performance aerating windows	100%	100%	D.2.9. at M18
Works in the second year			
<ul style="list-style-type: none"> • First aerating units manufactured, by GREENCOM. • Test and validation of the prototype via climatic chamber. • A test unit has been installed in a meeting room in Brussels and is still working at the moment. • The final design is validated and all the molds have been ordered. • The manufacturing and the delivery of the 22 units have been delayed because the works on the demo site hasn't started yet. However, most of the components are already in Greencom's premises. • SPB will order the 22 units, 6 weeks before needed. • TO AMEND THE GA: GREENCOM will transfer 25k€ of consumables in DEMO, to SPB, for them to execute the casing of the aerating systems. 			



3 Work Package 3 Progress: Zero emissions energy production technologies (RANK).

Task 3.1	Planned	Achieved	Deliverables
Technical requirements and specifications of the Cogeneration prototypes and its components	100%	100%	D.3.5. at M9
Works in the second year			
<p>ORC cycle definition.</p> <ul style="list-style-type: none"> Ended in Year 1 			
Task 3.2	Planned	Achieved	Deliverables
Design, assembly, testing and optimization of the Cogeneration prototypes.	100%	100%	D.3.11. at M18 D.3.19. at Month 21 (*) D.3.21. at Month 24 (*)
Works in the second year			
<p>ORC units development and manufacturing, one for each demo.</p> <ul style="list-style-type: none"> Prototype (scale 1:3) manufactured and tested in RANK Premises in Spain. Material, consumable, spare parts and all subcomponents of the 3 ORC units purchased at the end of month 17. Assembly of the real-scale prototypes starting in month 26. <p>(*) D.3.19. and D.3.21. related to the ORC: We are finalising the revision. These are confidential documents and will be sent for revision in early January (M27).</p>			



Task 3.3	Planned	Achieved	Deliverables
Design and manufacturing of the new collector fields for easy roof installation and operation at temperatures up to 300°C	100%	100%	D.2.9. at M18
Works in the second year			
<p>PTC collector development.</p> <ul style="list-style-type: none"> • Development by design, status 93%. • Development by testing, status 70%. <p>Manufacturing of solar fields, status 85%.</p> <ul style="list-style-type: none"> • Currently optimising procurement & manufacturing based on: <ul style="list-style-type: none"> ○ Supply base search for asking (whenever possible/meaningful) more than one offer to ensure good use of public money during BRICKER and competitiveness afterwards; ○ Introduction of MRP (Material Requirement Planning)-type methodology to further reduce cost, lead time and inventory to favour the future exploitation and upscaling of the technology. • Practical issues <ul style="list-style-type: none"> ○ Logistics transferred to ADU and GEX. Budget details to be finalized during this meeting ○ Orders of mirrors and control panels need to be aligned with expected shipment dates to avoid long storage time, which may lead to risk of theft and/or product damage. <p>Timelines to ship collectors to Spain and Turkey defined:</p> <ul style="list-style-type: none"> • Spain; Month 27. • Turkey; Month 28. 			



Task 3.4	Planned	Achieved	Deliverables
Development of optimized structures to connect and integrate the solar collectors' structure in different building roof configurations.	100%	100%	D.3.13. at M18
Works in the second year			
<p>Solar roof for Spain.</p> <ul style="list-style-type: none"> • 20 modules of the solar collector system PTMx-36, by SOLTIGUA. • Ground installation over separate foundations for each plate. • Mostly hooked shaped bolts. • Laser precision required 2-3mm tolerance in approximately 40m collector length. <p>Solar field for Turkey.</p> <ul style="list-style-type: none"> • 20 modules of the solar collector system PTMx-36, by SOLTIGUA. • Ground installation over separate foundations for each plate. • Water proofing needs special treatment (new water drainage system). 			
Task 3.5	Planned	Achieved	Deliverables
Control and hydraulic systems of the solar field adaptation to provide optimal temperature and flow conditions to the System	100%	100%	D.3.22. at M24 (*)
Works in the second year			
<p>Control and hydraulic systems of the solar field adaptation and System Integration for Spain, Turkey and Belgium.</p> <p><u>NOTE: Deliverable scope increased, new demo and new content included. Delivery date postponed to Month 28.</u></p> <p>The work presented includes the design and integration of the solar field with the main components. Since the solar field cannot be decoupled from other parts of the layout (ORC, biomass, etc.), the work has been deemed complete including the control logic and the architecture control list of the overall system. For these reasons they are also included in the present documents.</p> <p>The project partners that directly manage the three demo buildings are the Government of Extremadura (GEX) for the Spanish demo, Adnan Menderes University (ADU) team for the Turkish demo and Liege Provincial Building Service (SPB) for the Belgian demo. Each demo is requiring for the tender preparation a first list of active components, able to control the system's behaviour. Here these components are presented in the architecture control lists,</p>			



and the hardware requirements are introduced with a complete overview of the control part and a draft of the flow charts performed by FBK.

Task 3.6	Planned	Achieved	Deliverables
Biomass plant requirements definition to work as a hybrid system with the Cogeneration prototypes.	100%	100%	D.3.14. at M18

Works in the second year

Biomass plant requirements and specific design to work as hybrid system for the cogeneration prototypes.

SPAIN:

- Selection of the biomass boiler and auxiliary equipment.
- Analysis of the biomass market in Spain and specifically in Caceres (Supply capacity, prices)
→ **Chips** (Availability and good price): No space restrictions.
- Identification of the Normative related to biomass boilers for the Spanish demo case.
- List of possible Manufacturers/Providers

BELGIUM:

- Selection of the biomass boiler.
- Analysis of the biomass market in Belgium and specifically in Liege (Supply capacity, prices)
→ **Pellets** (Availability and high density): building and surrounding restrictions.
- Identification of the Normative related to biomass boilers for the Belgian democase.
- List of possible Manufacturers/Providers



Task 3.7	Planned	Achieved	Deliverables
Chiller plants requirements definition to work in tri-generation mode with the Cogeneration prototypes.	100%	100%	D.3.15. at M18
Works in the second year			
<p>Chiller plants requirements and specific design to work in tri-generation mode with the Cogeneration prototypes.</p> <p>SPAIN;</p> <ul style="list-style-type: none"> • Selection of the thermally activated cooling technology: • <u>List of possible Manufacturers/Providers</u> <ul style="list-style-type: none"> ✓ Nishiyodo ✓ Mayekawa ✓ GBU • Comments: The only conditions that must be fulfilled for its installation is to have walls and a roof to protect them from the external weather conditions. <p>It is necessary distances of O&M (indicated by the manufacturer).</p> <p>TURKEY:</p> <ul style="list-style-type: none"> • Selection of the thermally activated cooling technology: • <u>List of possible Manufacturers/Providers</u> <ul style="list-style-type: none"> ✓ Nishiyodo ✓ ECO-MAX ✓ Mayekawa • Comments: The only conditions that must be fulfilled for its installation is to have walls and a roof to protect them from the external weather conditions. It is necessary distances of O&M (indicated by the manufacturer). 			



4 Work Package 4 Progress: Integration of the BRICKER components in a whole system (EURAC).

Task 4.1	Planned	Achieved	Deliverables
Concept design, model design and simulation of the BRICKER technologies in different scenarios	various	various	D.4.7. in Month 12
Works in the second year			
Definition of BRICKER System for each demonstration			
SPAIN:			
<ul style="list-style-type: none"> ✓ Simulation boundary conditions and results have been reported in «Building modelling report – Spanish demo» available on Bricker’s Team Site ✓ Source of uncertainties: operation and real performance of existing air-source HP units, regulation of indoor air temperature, users’ behaviour 			
TURKEY			
<ul style="list-style-type: none"> ✓ Building boundary conditions for simulation purposes have been collected, agreed and integrated into a TRNSYS model; ✓ The presence of surrounding buildings influences solar gains. Their impact has been considered; ✓ The number of zones is high (150+) and not compatible with building+system yearly simulations. There is the need of appropriate simplifications... ✓ Step 1: simulations for each individual building floor have been carried out. In this phase, adiabatic boundary conditions are assumed between building adjacent fbuilding levels ($T_{set,heat}=24^{\circ}C$, $T_{set,cool}=25^{\circ}C$) ✓ Step 2: identification a limited number of zones which could be used for representing the whole building energy behavior (tradeoff between accuracy of the model vs simulation efforts) ✓ Step 3: validation of Step 2 (levels: F0, F1 and F2) ✓ Step 4: the heating demand of the building amount to 1.65 GWh/y or 74.3 kWh/(m²y), whereas the cooling demand reaches a value of 2.00 GWh/y or 98.6 kWh/(m²y) ✓ Heating and cooling systems are shared among Block A, Block C and Block D <p>ONGOING: Performance of existing gas boilers and compression chillers, mass flow rates, electrical efficiency of circulating pumps, control strategy</p>			
BELGIUM; Finished in Year 1			



Task 4.2	Planned	Achieved	Deliverables
Passive Systems dimensions and design, minimizing economic resources.	various	various	In Task 4.3.
Works in the second year			
PASSIVE SOLUTIONS			
SPAIN; There are no active solutions for the Spanish demo.			
TURKEY; Ongoing based on 3D building models and tender plans from the Property.			
BELGIUM; Finished in Year 1			
Task 4.3	Planned	Achieved	Deliverables
Active Systems dimensions and design, minimizing economic resources.	various	various	D.4.34. Turkey at month 28 (*) D.4.24. Belgium in month 24 (*) D.4.25. Spain in month 24 (*)
Works in the second year			
(*) Reloaded versions of these 3 documents will be released in Month 30 to 32 by EURAC with the Detailed control memories for the BRICKER SCADAs to be programmed.			
ACTIVE TECHNOLOGIES			
SPAIN			
<ul style="list-style-type: none"> ✓ Numerical models are customized according system componenets performance characteristics (parabolic trough collectors, biomass boiler, ORC unit, heat exchangers, adsorption chillers, heat rejection system) ✓ Control and operation strategies are currently under validation (heating/cooling schemes) or development (heat distribution system) ✓ Open issues: performance characteristics of oil and water pumps, geometric characteristics of thermal energy storages and hydraulic junctions ✓ Definition of KPIs: Final Energy (FE), Primary Energy (PE), Primary Energy Ratio (PER), Levelized Cost of Energy (LCOE) ✓ ONGOING: economic boundary conditions, investment costs of system components, district heating network. 			
TURKEY; Ongoing based on tender requirements.			
BELGIUM; Finished in Year 1			



Task 4.4	Planned	Achieved	Deliverables	
Development of the operation strategies	various	various	Contribution to others (see table below)	
Works in the second year				
OPERATION STRATEGIES				
<p>The work on the operation strategy has started for the Spanish demo. Regarding the Belgian demo, we should check if the local partners require any further support on the analysis. The system is going to work for most part of the year at always nominal power, thanks to an overwhelming thermal demand (around 1MW), and so the operation mode is thought to be quite straightforward.</p> <p>As for the Turkish demo, works are actually ongoing.</p> <p>In the following table, there is a partial progress indication:</p>				
	Turkey	50%	25%	Contributions to D.4.23.
	Belgium	50%	50%	Contributions to D.4.24.
	Spain	50%	50%	Contributions to D.4.25.
Task 4.5	Planned	Achieved	Deliverables	
Guides for commissioning and maintenance	10%	7%	D.4.34 at month 42	
Works in the second year				
GUIDES FOR DESIGN, COMMISSIONING AND MAINTENANCE.				
<p>Onur Energi as task leader has been planning the content and structure of these guides with the building owners and WP4 Leader.</p>				
Task 4.6	Planned	Achieved	Deliverables	
BRICKER concept transfer to social housing.	10%	5%	D.4.37 at month 48	
Works in the second year				
BRICKER CONCEPT TRANSFER TO SOCIAL HOUSING				
<p>TECNALIA as task leader has been working on the planning of these activities, which will start in January 2016, month 28.</p>				



5 WP5 Progress: DEMONSTRATION (ACCIONA).

5.1 Task 5.1. Monitoring and performance evaluation before renovation (ACC).

General status Table;

Task	Planned	Achieved	Deliverables
5.1.Turkey	66%	50%	None
5.1. Belgium	66%	66%	
5.1. Spain	66%	66%	

As a clarification to make a difference between Work Packages 4 and 5 at this point, it is to be said the data collection or data gathering listed in Tasks 5.1 and in Work Package 4.

Task 5.1 is related to the REAL DATA METERED in the demonstration buildings with the monitoring equipment selected, purchased and installed within the BRICKER Project. The purpose of this monitoring is to evaluate the building situations BEFORE (in the so called pre-monitoring – 1 full year) and AFTER (post-monitoring year) BRICKER with a real basis, and focusing on the energy CONSUMPTION of the areas retrofitted (in Spain, the whole building, but in Turkey and Belgium, BRICKER will act on certain areas, not the whole building complex).

This task is planned to be at 2/3 of its completion once all data is gathered and 3/3 when analysed. At this stage, after the second year, we have one full year of pre-monitoring data ALREADY COMPLIED for Belgium and Spain (yet to be analysed), and we are still collecting data of the pre-monitoring in the Turkish demo.

In Work Package 4, the data gathered is related to the real HVAC systems installed, to the real constructive details of the buildings, to the real operation and building use and climatic conditions, and so on, with the aim of obtaining ENERGY DEMAND (and energy demand reduction thanks to the implementation of the BRICKER technologies) via computer SIMULATION.

These are both complementary activities aiming to demonstrate the impact of the BRICKER solutions on the demonstration buildings.



General budgetary situation for the pre-monitoring:

#	What?	Spain	Belgium	Turkey
A	Sensors, network analysers, thermometers and other metering equipment.	CEMOSA: 10.000€ to purchase these consumables	ULG: 10.000€ to purchase these consumables	ONU: 10.000€ to purchase these consumables
B	Installation of A, including cables, protections and other material needed.	CEMOSA: 4.000€ to subcontract the installation	ULG: 4.000€ to subcontract the installation	ONU: 4.000€ to subcontract the installation
C	Data collectors and communication equipment: BRICKER monitoring cabinet.	ACCIONA; 25.000€ for the 3 demo sites, to purchase servers or any other communication equipment needed.		
D	Installation of C	GEX, included in their subcontracting demo budget	SPB, included in their subcontracting demo budget	ADU, included in their subcontracting demo budget

Table 5.1: Monitoring budget table per demo.



5.2 Task 5.2. Manufacturing of the solutions to be installed in the demonstration buildings (ACC).

General status Table;

Systems	Partner	WP	Tasks	Manufacturing plan	Expected delivery date on site
PASSIVE	GRE	2	Aerating systems for Belgium	March 2016	March 2016
	ACC	2	Façade for Turkey	September 2015	December 2015
	PUR	2	PIR Panels (with and without PCMs) for Belgium	March 2016	March 2016
ACTIVE	SOL	3	Solar field for Turkey	February 2016	March 2016
	SOL	3	Solar field for Spain	March 2016	April 2016
	RNK	3	ORC for Turkey	March 2016	May 2016
	RNK	3	ORC for Spain	Pending from building owner	Pending
	RNK	3	ORC for Belgium	February 2016	March 2016

5.2.1 Tender preparation: prices and technical specification for the public tender (ONU, SPB and CEM).

Turkey (ONU);

After some meeting and considering different legal, technical and administrative issues, the Turkish Demonstrator will be retrofitted in 2 phases, indicated in the table below:

Tender No	Task	Budget	Construction works (months)
1	AD Chiller Purchase	Ongoing	30-31
2	Active and Passive Sytems	Ongoing	26-33
3	Transportation and Customs Clearance	Ongoing	27-31

Table 5.2: Turkish demo tenders' table.



Belgium (SPB):

They have planned the following sequence of procurements, divided in 4 independent contractors. Up to date, all the deadlines in the table below have been accomplished.

There have been some economic deviations in the tender number 1, which are going to be absorbed by the building owners, Partner SPB.

The final economic data is not yet available for all the tenders, although the subcontractors for tenders 1 and 2 are already selected (3 and 4 are to be chosen in June 2015 according to the dates indicated in the table).

Tender #	Measure	Budget	Tender start/end date	Works execution start/end date
1- BRICKER	142H94: Sub-contract for "Bricker: Installation of biomass cogeneration O.R.C.-unit, hydraulic piping, electric cables, control system, biomass boiler plant and biomass-storage."	Budget in 2014: 415.800 € excl. TVA	28/08/2014 to 23/12/2014	01/06/2015 to 31/03/2016
2-Skin Façade	143H94: Sub-contract for "Bricker: Retrofit of the main skin facade for block 1."	Budget in 2014: 630.000 € excl. TVA	29/05/2014 to 04/11/2014	01/06/2015 to 31/03/2016
3-Passive roof	144H94: Sub-contract for "Bricker: Roof insulation for block 1 and 6"	Budget in 2015: 214.500 € excl. TVA	25/09/2014 to 25/02/2015	01/06/2015 to 31/03/2016
4-Passive façades	145H94: Sub-contract for "Bricker: Insulation of external walls, replacement of windows and integration of decentralized ventilation-units for blocks 1 and 6."	Budget in 2015: 1.041.620 € excl. TVA	25/09/2014 to 25/02/2015	01/06/2015 to 31/03/2016

Table 5.3: Belgian demo tenders' table.



Spain (CEM);

The tender preparation stage has been separated in four contracts for the purchase, installation, the operation and maintenance of the BRICKER GEX.

Tender #	Measure	Budget	Tender start/end date	Works execution start/end date
1- Warehouse	Warehouse construction to house the production central of BRICKER system.	Budget in 2015 & 2016: 90.000 € excl. VAT	28/06/2014 to 20/05/2015	06/06/2015 to 01/03/2016
2-Solar	Concrete foundations in the roof of the building.	Budget in 2015: 75.000 € excl. TVA	28/06/2014 to 10/06/2015	01/07/2015 to 20/09/2015
3-HVAC	Hydraulic and electrical connections between the production central and the administrative building. New HVAC system.	Budget in 2015 & 2016: 160.000 € excl. TVA	21/08/2014 to 15/07/2015	26/08/2015 to 01/05/2016
4-BRICKER	BRICKER Tender*	Budget in 2015: 735.000 € excl. TVA	21/08/2014 to 10/08/2015	08/09/2015 to 30/05/2016

Table 5.4: Tender contracts for Spain.

* The BRICKER tender includes;

- Purchase the biomass boiler, according to the specifications provided by Partners, construction of the biomass storage room. Technical support (one week, one technician) will be covered in the tender for the connection, and start-up.
- Purchase the adsorption machine and the cooling tower, according to the specifications received from BRICKER. Installation in the place selected, construction works and technical support included.
- Contract including installation of all the BRICKER Components, control system, start up and maintenance during one year.

Equipment available for the contractor will be:

- Solar collectors and ORC, coming from BRICKER.
- Biomass, adsorption and cooling tower.

Equipment to be purchased and installed by contractor will be:

- Buffers, tanks, heat exchanges, piping, valves, and control and hydraulic...



5.3 Task 5.3. Installation, commissioning and start-up (ACC).

Not started - Plans are ongoing to precisely define the sequence of activities to be carried out in each demo site, according to the specificities.

General milestones indicate that all construction works will start in the summer of 2015, and the proper execution without delays or over costs is also under development, to try to finish in time to have at least one full year of post monitoring to evaluate the overall impact of the interventions in the 3 demonstrators.

5.4 Task 5.4. Monitoring and performance evaluation of the buildings after the renovation (ONU).

Not started - Plans are ongoing to precisely define the sequence of activities to be carried out in the analysis of the data bases to be produced in each demo site, according to the equipment installed during the execution works defined in the tenders, the occupation patterns, the weather conditions and the rest of the parameters to be considered in tasks 5.5. and 6.3.

5.5 Economic analysis of the 3 demo site implementations (TEC).

General status Table;

Task	Planned	Achieved	Deliverables
5.5	30%	10%	D.5.38 at M48

This task focuses in economic analysis of the BRICKER interventions based in energy and investment figures obtained in T5.1 to T5.4. The main objective is to update the preliminary analysis carried out during the proposal phase with real monitored data and real expenses, in order to validate the cost effectiveness of the BRICKER solutions. The process

5.5.1 Economic and Energy data compilation for the different energy sources of the building before and after renovation (CAR)

Partial progress items:

- Pre-intervention energy data has been collected from the three demonstrators, to be completed according to the progress reported in 5.1.

5.5.2 Economic and Energy data compilation for the BRICKER technologies installed in the building (TEC)

Not started – scheduled from M15 to M24, this subtask is dependant of tender contracting as in 5.2. Economic data collection will be collected once the tendering process is completed.

- Preliminary investment data available but needs to be completed within Task 5.2.



- Post intervention energy data will be taken from T5.4 (not started)

5.5.3 Analysis of context scenario and projection to future market scenarios (TEC)

Not started – scheduled from M37 to M48.



6 WP6 EXPLOITATION AND REPLICATION (STEINBEIS).

This report covers the timeline from M12-24 and does only present overall progress. If details are relevant for evaluation, they can be provided on request.

To ensure the synergies between the relevant WPs an exploitation board was created consisting out of the coordinator ACC and the partner for replication TEC. All WP leaders are involved as being part of the Steering committee meeting. During M18 and M24 an exchange of methodological approach with the ESIC service has been initiated (in person Mounib Mekhilef) who attended the third exploitation workshop. The output of the involvement of the ESIC service will be a report which will be sent to the EC (also due in the frame of the ESIC service tender), which will also be shared with ACC and SEZ beforehand. Previous to the report Mr Mekhilef pointed out that the BRICKER exploitation approach and the ESS service of ESIC are similar and that the BRICKER exploitation plan leads straight to the market deployment.

6.1 Task 6.1. Exploitation (SEZ).

General status Table:

Task	Planned (M1-48)	Achieved	Deliverables
6.1.	100%	45%	Deliverable 6.17/18 (M18); Internal Del. M3, M17, M23, M26

Partial progress items:

6.1.1 Identification and definition of the relevant project results (SEZ).

Identification of commercial, academic and other exploitable results via exploitation workshops:

- The first workshop “**Identification of exploitable results**” took place in October 2014 in Caceres - Spain. *Internal Deliverable available (M17)*
- The second workshop “**IPR Strategies and management**” took place in a series of webinars from February to July 2015. *Internal Deliverable available (M23)*
- The third workshop “**Exploitable Results (Joint Developments) / Customer Segments; Value Propositions; Key Partners / Roadmapping**” took place in September 2015 in Liège - Belgium. *Internal Deliverable available (M26)*
- The fourth workshop “**Business Models**” will take place in March 2016 or Sept/Oct 2016.
- In case further WS are needed a continuation will be discussed with all partners.

Status up to date:

The aim was to identify technology combinations that could be exploited as a joint product or developed methodologies to be exploited as a:

- BRICKER product/service taking into account the expertise of the partners and the
- BRICKER methodology taking into account the technological improvements and external expertises not binding to partners out of the consortium.



A rating at the end of WS3 highlighted 4 BRICKER packages (services/products) of exploitable results:

- i. **BRICKER PACKAGE:** BRICKER passive solutions *(more details available)*
- ii. **BRICKER PACKAGE:** BRICKER Trigeration System (active) *(more details available)*
- iii. **BRICKER PACKAGE:** Pre-Investment Analysis *(more details available)*
- iv. **BRICKER PACKAGE:** Simulation & Analysis (STEP 1) & PACKAGE: Simulation & Analysis + DESIGN (STEP 2) *(more details available)*

The former identified joint exploitable results (ER) 2 was not confirmed in this meeting, and needs another attention in a follow up.

The suggestions of the PTA / EC to work towards an adaptable BRICKER methodology that shows the benefits to the clients taking into account the technological improvements and external expertises not binding to involved partners out of the consortium were not agreed on to be a practical result at this stage.

The highlighted (bold) ERs received the most ranking points and were used for the further exercise of this workshop. SEZ pointed out that in a next step it will become important to describe the ERs more precisely (specifically: title, ownership, background involved, and contributions by partners, access right claims and exploitation claims). Only with this information, conflicts of interest related to IPR issues can be discussed.

Deviation	Explanation and Solution proposal
none	Not applicable

6.1.2 Deep market analysis (SEZ, partners’ involvement)

The general structure of the deep market analysis has been set up and adapted. A roadmap for the actions to be done was created. The fine tuning of work is currently under development. Joint collaboration between SEZ and TEC for the preparation of questionnaires for the partners and expert interviews. According to project implementation partners’ input will be requested and implemented in 2016.

Deviation	Explanation and Solution proposal
Market analysis – time schedule M4-19 <i>this deviation was already mentioned in the review report on M18</i>	Market analysis was expected to be nearly finalised M18. Market analysis as ongoing / regular updated document following the progress of project (until M36 expected),

6.1.3 Value innovation analysis of the main results (SEZ).

Continuation of this activity that started with the first exploitation workshop where the partners presented their solutions during the exploitation workshop 2 + 3 where all partners further specified exploitable results (consolidating, BRICKER packages) taking into account the relevant issues worked out in the Business Model Canvas related to value propositions of the



solutions. The in deep work in smaller group will enable to work the value innovation analysis as described in the DoW.

6.1.4 Risk assessment and overall IPR strategy (SEZ)

Risk assessment: Risks on exploitation (personnel and organisation related, political, IP, market, financial, environmental, technological) are regularly identified in the exploitation workshops. The WSs help to identify those results that need protection and give more clarity about ownership – especially regarding joint developments that result in joint ownership. During each workshop the list of risks and alternative solutions has been worked out.

IPR strategy: IPR methodology has been introduced during WS 1-2. The importance of IP relevant issues were again highlighted during WS 3 by the ESIC service. The exploitation workshops will guide the decision making of each partner related to IP protection. It is the basis to decide on results that need protection and gives more clarity about ownership – especially regarding joint developments that result in joint ownership.

6.1.5 Pre-assessment of the results market potential and exploitation option (SEZ, input by partners).

Not started yet.

6.1.6 Technology implementation plan (SEZ).

Not started yet. Road mapping issues were part of WS 3, and further input will come from WP 4 + 5.

Deviation for 6.1.4 – 6.1.6	Explanation and Solution proposal
No deviation	-

6.2 Task 6.2. Business models (SEZ).

General status Table;

Task	Planned M1-M48	Achieved	Deliverables
6.2.	100%	15%	Input for D.6.17.

The identification of a suitable exploitation strategy for the partners regarding the most promising commercial exploitable results differs in the implementation depending on the status of ownership, networks and capability of the organisation, strategic plans/portfolio of the organisation etc. These criteria are already introduced and consolidated as part of task 6.1 and will help to build on different approaches of business models. All approaches are implemented to support the continuation of exploitation steps:



- Learning from good practices of similar EU projects (FP6, FP7, CIP, H2020) → *work has started*
- Individual support is given to identify strategic partnerships for joint exploitation with externals (= synergies with EU-wide Business Networks like Enterprise Europe Network (EEN), information on cooperation requests and offers, information about brokerage events organised by the network); → *work is ongoing; Status of outputs:*
 - a) *Expression of Interest to catalogue of partner opportunity profiles (EEN):*
 - EURAC requested with seven expressions of interest to profiles that are of strategic interest for them. SEZ generated the connection to their local EEN office. They are now in contact with their local EEN partner for further steps like development of an own Business/Technology Profile. This will help to offer their expertise generated in the BRICKER project to potential strategic partners in EU.
 - ACC requested five expressions of interest to profiles. Same procedure by SEZ as described for EURAC.
 - OZU requested two expressions of interests. Same procedure by SEZ as described above.
 - b) *Information about brokerage events / company missions (EEN / KIC InnoEnergy) is planned for M24 onwards*
- Individual support in identifying open calls for proposals for market uptakes in H2020 or KIC InnoEnergy innovation projects; → *work is ongoing; Status of outputs:*
 - SOLTIGUA submitted a H2020 SME Instrument phase 2 proposal (cut of dates 06/2015 and 09/2015) with support of SEZ. The proposal has been selected for funding. The topic of the proposal¹ is linked to BRICKER outputs and experiences gained so far. It therefore would help SOLTIGUA to step towards the market and the implementation. SEZ explained the SME Instrument rules, application documents, and worked out the focus of eligible actions as well as the issues related to the business model part.
- Development of suitable business model frameworks (according to the Business Model Canvas² but also according to business models def. in the DoW: from single product selling to whole package of ESCO model) → *work is ongoing; initiated in the exploitation WS*

Deviation	Explanation and Solution proposal
No deviations	-

¹ Proposal Title: Re-deployable solar boilers based on concentrating solar collectors for ESCO type sale of thermal energy to industrial processes.

² The Business Model Canvas is a strategic management and lean start-up template for developing new or documenting existing business models. It is a visual chart with elements describing a firm's/product's value proposition, infrastructure, customers, customer channels and relations, as well as finances (like revenue streams and cost structure).



6.3 Task 6.3. Replication (TEC).

General status Table:

Task	Planned M1 - M48	Achieved	Deliverables
6.3.	100%	5%	D.6.18. at M18

Partial progress items:

6.3.1 Identification of the Public Building Typologies (GEX).

Started in month 6, with first input received from ACC (study of BPIE “A country-by-country review of the energy performance of buildings“). This step needs further input of information by partners.

6.3.2 BRICKER integration potential evaluation in each building type (input from WP4) (GEX).

Not started.

6.3.3 BRICKER impact assessment: BRICKER contribution on each building type (input from WP4) (GEX).

Not started.

6.3.4 Roadmap for implementation (input from task 6.2.) (GEX).

Not started.

6.3.5 Alignment with European Action Plans (GEX).

Not started.

Deviation for 6.3.1 – 6.3.5	Explanation and Solution proposal
No deviations	-



7 WP7 DISSEMINATION AND COMMUNICATION (YOURIS).

Task	Planned	Achieved	Deliverables
7.1	various	various	
Works in the second year			
<p>The Dissemination and Communication Secretariat has implemented the following activities</p> <ul style="list-style-type: none"> ✓ Collecting information about the publication and events participation actions of partners (February and September 2015) ✓ 4 Press releases ✓ Set up and administrate BRICKER company page on LinkedIn: https://www.linkedin.com/company/bricker ✓ Preparing and distributing 2 BRICKER newsletters (Oct 2014 and May 2015) ✓ Participating in EeB PPP Impact Workshop 2015 			
Task	Planned	Achieved	Deliverables
7.2	various	various	
Works in the second year			
<p>The BRICKER web site www.bricker-project.com has been updated regularly. Three major updates took place</p> <ul style="list-style-type: none"> ✓ New section “Interventions at the demo sites” ✓ Enhanced description of the Turkish demo site ✓ Implementation of image gallery to watch the progress of interventions at the demo sites 			
Task	Planned	Achieved	Deliverables
7.3	various	various	D.7. 16 in Month 18
Works in the second year			
<p>In the framework of the BRICKER D&C Plan, the following actions have been implemented by the partners and the D&C Secretariat</p> <ul style="list-style-type: none"> ✓ 4 press releases, 1 article and 5 interviews published on BRICKER web site and distributed through multiplier channels and social web ✓ 16 publications in specialised journals, newsletters and on partner’s web sites ✓ About 30 contributions to Conferences, Fairs, Workshops, Training ✓ Organisation of joint workshop with fellow projects RESSEEPE and A2BPEER at Sustainable Places 2015 “Innovative Retrofitting Activities” 			



8 WP1 Project Management (ACCIONA).

8.1 Task 1.1. Governance structure, communication flow and methods (ACCIONA).

Amendment to the Grant Agreement.

The Project Coordinator is preparing an amendment to the Grant Agreement due to the modifications appeared during the project execution in the first 2 years.

After the first period, Month 18, all expenses and technical progress was accepted by the European Commission, so the DoW, dated 25-7-2014 needs to be modified according to the following list of changes, which is under permanent modification.

Modifications with respect to the DoW:

WP2: Task 2.1. Scope change in task 2.1. of the DoW.

Due to the research works performed in the different activities and tasks during the first year of project execution, there has been a scope deviation from the content of work in relation to the work described in the Description of Work, *Task 2.1. Design and development of a sustainable and innovating ventilated façade for the Turkish demo.*

As this change is a consequence of manufacturing and testing of prototypes and the goal of the Project in the Turkish demonstration site has not suffered significant deviations, it has been considered that another Amendment to the Grant Agreement would not be necessary, although this change is reported to the European Commission in this email and in other supporting documentation to come in the following weeks, to confirm this position.

The change consists on the following:

- The original material selected for the façade, called Green Cast and developed by ACCIONA, has been replaced for an alternative lightweight polymer-concrete based on recycled materials.
- The reasons that justify this change are the following:
 - ✓ The Green Cast was tested in the ACCIONA facilities in Spain, and it was demonstrated that it does not meet the seismic and wind load requirements of the REAL demo site in Turkey. Despite the fact Green Cast's mechanical properties can be definitely enhanced; BRICKER approach and timing do not permit to do it. Therefore, with these results on the table, ACCIONA carried out a market study to search for innovative, sustainable and adequate material to be implemented in the Turkish demonstration Hospital, with the warrantee of safety during installation, operation and life-time of the solution and trying to keep the scope of the targets established
 - ✓ Also the Turkish regulation for seismic and wind load requirements was analysed to make the selection of this alternative material, as there two parameters are quite limiting in relation to the materials that can be used in this country.



- ✓ The final solution derives from a ready-to-market lightweight polymer-concrete which base composition has been modified pursuing the BRICKER goal to develop an innovative, sustainable and lightweight ventilated façade. The product proposed is made of crushed marble, recycled crushed glass, low-density aggregate and polyester resin with recycled PET. The material's manufacturer is a Spanish company with a long experience in plastic and ceramic manufacturing in the building sector both for envelope and indoor applications and adaptable to market and client demands.

This change has been sent to the PTA with a request for revision/approval of the proposed changes.

On October 1st, 2104, our intention is to launch the purchase order of the materials to the manufacturer: As the delivery period after confirming the purchase is long (2-3 months) and we are willing to deliver the material by ship to Turkey (2-3 weeks plus border protocols), we would like to start with this purchase order with the intention of avoiding Christmas period and future delays in the project execution.

WP2: Task 2.3. Work Package 2 changes in the aerating systems.

Deliverable D.2.10 changes its dissemination level from PUBLIC to RESTRICTED as it contains confidential information from the ventilation system manufacturer, partner GREENCOM.

The number of aerating systems to be installed in the real demo changes from 15 to 22, keeping the same budget, due to the window size. More information can be found in the Deliverable D.2.10.

WP3: Deliverable D.3.12 postponed from Month 18 to Month 27.

D.3.12. Novel solar prototype fields developed and manufactured, due in month 18, has been postponed to month 27. The PTA accepted this relocation in an email on January 2nd 2015. The reason for this change is that the building owners will not need the collectors on site until the subcontractors start the execution works to install the BRICKER system, and this will not happen until the end of the summer 2015.

WP3: Task 3.3. Turkish solar field is ground mounted rather than roof mounted.

Justification included in the report D.3.13.

WP3 deliverables modified delivery date.

D.3.19 and D.3.22 move from Month 21 and 24 respectively, to M27 and M28.

WP4 deliverables are decoupled as follows;

D.4.23, D.4.24 and D.4.25. are due in month 24, containing the technical description of the works to be implemented in the demonstration buildings AND A PARTIAL description of the control system to be integrated in the active solutions placed.

WE ADD HERE D.4.23bis, D.4.24bis and D.4.25bis where the DETAILED control memories for each demonstrator are listed by Deliverable owner EURAC in close collaboration with ACCIONA and FBK.



WP5 deliverables postponed, mainly due to administrative delays related to the public tender.

- ✓ *D.5.26. Energy performance assessment in three demos (month 24 to Month 28).*
- ✓ *D.5.27. All solutions manufactured and at the demo sites (month 24 to month 28).*
- ✓ *D.5.28. Technical tender documents, 3 demos (month 24 to month 28).*

WP6: New list of deliverables for Work Package 6.

As recommended by the PTA (Mr. Cousin) during the Kick-off meeting, the 6 deliverables of WP6 related to the exploitation and replication reports for M18, 36 and 48 (total **six** documents) will be merged to **three** reports covering exploitation and replication, due in months 18, 36, 48 with specific sections, so there will be three instead of six deliverable reports. This way, the new deliverables for Work Package 6 are:

- D.6.17 and D.6.18. → D.6.17.
- D.6.32. and D.6.33. → D.6.32.
- D.6.39. and D.6.40. → D.6.39.

Some budget relocations (minor subcontracting expenses) are to be requested, and justified in due moment at the end of Period 2.

In the end of Year 2, the following shifts are indicated;

- ✓ DEMO Subcontracting transport costs are to be shifted to the Building owners, so:
 - 10.000€ transport cost to ship façade, from ACC to ADU.
 - 10.000€ transport cost to ship 3 ORC units, from RNK to the demo owners.
 - 12.000€ transport cost to ship solar collectors to Spain and Turkey, from SOL to ADU and GEX.
 - 4.000€ cost to ship PIR Panels to Liege, become 6.000€ due to updated quotation.
 - 4.000€ of ULG move to SPB for the installation of the monitoring devices in the building in Liege.
- ✓ DEMO Consumables;
 - GREENCOM shifts 25.000€ to SPB
 - GREENCOM leaves 10.00€ at the disposal of the consortium for Period 2.
 - PURINOVA leaves 10.000€ at the disposal of the consortium for Period 2.
 - ULG shifts 10.000€ to SPB.
- ✓ DEMO Durable equipment;
 - PURINOVA leaves 2.835€ at the disposal of the consortium for Period 2.

8.2 Task 1.2. Overall coordination (ACCIONA).

According to the Project Coordinator, the Project Team is working efficiently and with a good performance. Considering the high number of Partners and the 3 demos, the level of collaboration, performance and involvement has been really positive during this first 2 years.



It is to be reported the remarkable effort made by most of the members of the Project Consortium, when we identified during the first weeks of the Project execution, that the project Plan (Gantt Chart) had to be compressed to allow the building owners have time to prepare the Public tender documents (legal and technical), and most of the technical decisions had to be taken during the first 18 months of the Project instead of having 24 months as it was originally planned.

However, it becomes **mandatory to report a delay in the preparation of the public tenders** by the Public Bodies who own the demonstrator buildings. As it is known, they are all Public Authorities, and as such, have suffered a delay in the selection of the subcontractors via Public tender. These delays have had a different origin, and we have tried to compress the Gantt Chart in order to absorb them. At this point, December 2015 is a moment where;

- ✓ Belgian demo; Subcontractors are selected, although we are waiting for the license to start the construction works. It was expected for September, then delayed and now we are willing to receive it in December 2015, to start working on the building in January 2016.
- ✓ Spanish Demo; there were elections in the Region in March, and the Government changed its political sign. All technical documents are ready (in Spanish) and we are just waiting for January 2016 to start launching the subcontractor selection. Works are also planned to start in early 2016.
- ✓ Turkish demo; although they joined late to the GA, they are now in line with the other 2 demos. We are finalising the technical preparation and tenders will probably be launched early in 2016. Construction works will start a bit later than in the other demos, but not later than April 2016.

Deliverables.

Deliverables from this first 2 years of the Project have been produced, reviewed and most of them approved by the European PTA assigned to the Project. All of the approved ones are available on the BRICKER TEAM SITE and the SESAM system of the European Commission, according to the original plan and with the approval of the Project Technical Advisor.

Deli	Month	PTA	Final	SESAM
7.1	1	✓	✓	✓
1.2	3	✓	✓	✓
7.3	3	✓	✓	✓
7.4	6	✓	✓	✓
3.5	9	✓	✓	✓
1.6	12	✓	✓	✓
4.7	12	✓	✓	✓
2.8	14	✓	✓	✓
2.9	14	✓	✓	✓



Deli	Month	PTA	Final	SESAM
2.10	18	✓	✓	✓
3.11	18	✓	✓	✓
3.12	28	✓	✓	✓
3.13	18	✓	✓	✓
3.14	18	✓	✓	✓
3.15	18	✓	✓	✓
7.16	18	✓	✓	✓
6.17-18	18	✓	✓	✓
3.19	21 → 27	✓	✗	✗
1.20	24 → 27	✓	✗	✗
3.21	24 → 27	✗	✗	✗
3.22	24 → 28	✗	✗	✗
4.23	24 → 28	✗	✗	✗
4.24	24	✓	✓	✗
4.25	24	✓	✓	✗
5.26	24 → 28	✗	✗	✗
5.27	24 → 28	✗	✗	✗
5.28	24 → 28	✗	✗	✗

8.3 Action plan / follow up

After the Review Meeting in Brussels in month 18, organized during the 15th and 16th of April 2015, a number of action points to update the present report are collected, and Partners agreed on preparing the present updated version of the report, in the date of the cover page.

The updated version of the Work Plan is the best planning tool that the Consortium has developed, together with the fluent communication and working atmosphere already existing among all Partners of the Consortium.

