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CROSS-BORDER COOPERATION IN THE MEDITERRANEAN

DIDSOLIT-PB

Project funded by the EUROPEAN UNION

DIDSOLIT-PB: Development and implementation of decentralised solar-energy-related innovative technologies for public buildings in the Mediterranean Basin countries.

Coordinating Institution: BEG-INCERS Research Group – Universitat Autònoma de Barcelona (UAB)

Report 8

Public Buildings selected, and Solar installations to undertake in them (conceptual designs)

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ENPI-CBCMED Strategic Project I-A/2.3/233 [2012-2015]

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Partnership:

- UAB, BEG Research Group (Leader), Spain, (Mediterranean Region: Catalonia)
- AEIPLOUS, Greece, (MR: Ditiki-Ellada)
- Egyptian Association for Energy and Environment, EAEE, Egypt (MR: Marsa-Matrouh)
- Balqa Applied University, BAU, Jordan (MR: Al Balqa)
- Alexandria University, AU, Egypt (MR: Alexandria)
- Mediterranean Agronomic Institute of Chania, MAICh, Greece (MR: Crete)
- Eco-System Europa, SL, *EsE*, Spain (MR: Catalonia)

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CONTENT

INTRODUCTION

In this document the public buildings that have been finally selected –out of the preselected ones (pb)- for carrying out applications of the Project innovative solar-systems (b) are presented. The criteria we have followed for the selection, as well as for deciding the type of innovative solar-systems –from the Project's 'chart of options'- to apply in each one, is also explained. And for each selected building, the features of the innovative solar-system planned and decided –i.e., the conceptual designs- are summarised

That content comes basically from activity 5.3 of the Project's work plan. The following pages build on the internal, more detailed, working documents: *T.5.3.4 selected (report)*, *T.5.3_selected (brochure)*, and *3.PTT selected buildings_v3.* It encompasses the most important information related to the building and technology selection: building suitability (1), technology proposal (2) and budget alignment (3).

The selection criteria defined by the project partnership, through its Project Technical Team (PTT) have been:

1. Owned and used by public institutions. Energy savings/incomes from the renewable energy generation must benefit the public institution. External energy management of the building (ESCO) it's also possible provided the last premises are fulfilled.
2. Buildings with especial visibility or public interest will be particularly valued.
3. The public beneficiary of the installation has to be able to take over some complementary costs (associated to the strictly renewable energy system: technical rooms, structural reinforcements, etc)
4. The building owner and user must get the compromise to carry out the operation and maintenance of the RE system (at least 7 years after its commissioning).
5. The system should be defined at the beginning of 2014 and executed before June 2015.
6. Buildings with good energy performance will be prioritized (coherence with nZEB initiative).

   RE facilities could contribute to decrease the building energy demand (on the logics of the nZEB policies) by minimizing the solar gains to the building during hot seasons.
7. Buildings with significant continuous loads (during the day/night period and along the year)
8. Building should be properly constructed, with no significant issues in their structural system and their watertight envelope. It should have enough envelope surface to integrate the RE systems
9. Building energy systems (electrical, HVAC) should be in good conditions and should allow the RE interconnection.

10. The building should allow accessible data collection of:

- General data (year of construction, building owner and user, gross area…)
- Occupation schedule
- Building features (construction)
- Building envelope parameters
- Electric system
- Heating / Cooling system
- Energy consumption data: electricity and gas consumption, energy consumption profile
- Monitoring system
- Storage system

The most challenging points taken into account have been:

- Public access, educational purposes and maintenance commitment have been prioritized at the building selection.
- It is required a contract with the building owner and user. It should be signed before the issue of the Public Tender process.
-

Formal approval: The selection here presented is the result of the PTT tasks and final evaluation and approval. The selection was then approved by the Project Management Board:

Technical Team evaluation and approval, and Project Management Board approval

Partner	Technical Expert	Evaluation and Approval	Local Manager	Approval
P1.AEIPLOUS	Ilias Georgakapoulos	**06.10.2014**	Vagelis G. Papadakis	08-10-2014
P2. EAEE	Hisham El Agamawi	**06.10.2014**	Nahla Gadallah	08-10-2014
P3. BAU	Ayman Magableh	**06.10.2014**	Mohammed Matouq	08-10-2014
P4. AU	Ashraf Abdelwahed	**06.10.2014**	Ossama El-Shazly	08-10-2014
P5. MAICh	Nicolas Boretos George Angelakis	**06.10.2014**	Ioanis Vourdoubas	08-10-2014
P6. EsE	Silvia Mata	**30.09.2014**	Soledad Vergés	08-10-2014
B. UAB	Joan Carles Almécija	**30.09.2014**	Joaquim Vergés	08-10-2014
B. UAB	Alex Parella (PM)	**30.09.2014**		

1. SUMMARY ON THE 'B' PUBLIC BUILDING SELECTED

1.1 Number of buildings

There are **18 buildings proposed** as "selected buildings" (b) + **2 pilot applications (CSP)**, which can be considered as "Solar applications", since they are supplying energy to the buildings.

In principle, the greater number of buildings, the best dissemination effect. However, we need to be cautious and measure our strengths to deal with the construction process

Partner	N selected buildings 'b' (18+2)	N minimum 'b' (10)
P1. AEIPLOUS	1	1
P2. EAEE	4	3
P3. BAU	5	3
P4. AU	3	2
P5. MAICh	1	1
P6. EsE-UAB	4+2	2

1.2 Building ownership and use

- **9** of the 18 proposed buildings are **owned/used by Project partners** (5 BAU; 3 AU; 1 MAICh).

In order to have a good dissemination effect, a big **number of public authorities** has been promoted (10 different public owners).

Building owners (11)	N of buildings (18+2)
University of Al-Balqa, JO	2
HUC, Al-Huson College, JO	3
Matrouh government, EG	4
University of Alexandria, EG	3
Ministry rural develop. & food, GR	1
Ministry of Economics, GR	1
AMB (Area Metropolitana BCN), SP	1
Catalonia government, SP	1
Mollet Health Foundation, SP	1
Sant Cugat City Council, SP	2
Politech. Univ. Catalonia (UPC), SP	1

-In total, 6 different building uses:

Different uses (6)	N of building (Partners)
University / scientific	11
Secondary school	2
Health Center	2
Culture center	1
Public office building	4
Waste treatment	1

1.3 Type and size of solar-systems scheduled for each building

1.3.1 Power schedule

- Each partner reaches its power target.

Partner	Installed power Proposed (277.6 kW)	Installed power Minimum (264 kW)
P1. AEIPLOUS	21	19.8
P2. EAEE	79.4	79.2
P3. BAU	85.7	79.2
P4. AU	29.5	39.6
P5. MAICh	13.8	13.2
P6. EsE-UAB	48.2	33

- 25 different systems have been proposed, with a total amount of installed power over 277.6 kW.

Partner	KW (277.6 kWp)	N systems (24)	% kWp
BIPV	**22.5**	**21**	**91.0%**
Crystalline	203.1	15	73.2%
Thin Film	28.1	3	10.1%
Thin Film flexible	21.3	3	7.7%
PV Cooling*	30*	2*	
Dish Stirling	**8**	**2**	**2.9%**
Parabolic Trough-SCH	**17.1**	**1**	**6.2%**

**PV cooling KW are not included in the total amount, since they are already considered as BIPV kW*

- **BIPV** is going to be the main application. It provides a wide range of technological and cost options, from 3,5 - 4,75 €/Wp. We need to focus our efforts in the "Executive project" and "Tender" stages in order to fit all the technical requirements in the assigned budget.

Primary structures design and execution, like canopies, pergolas or brise-soleils, will be specifically challenging.

- Dish Stirling has been selected by 2 partners (BAU and EsE-UAB) due to its technological dissemination effect and the modularity of the system costs, although its expensive cost ratio. The "Pilot" stage, to be implemented in Barcelona till the end of Summer, will be extremely important to learn from the mounting and operation process. Technical experts and SMEs local technicians involved in the installation can attend the programmed training session.

- Parabolic Trough - Solar Cooling and Heating is the most challenging technology in terms of energy performance and technical and economical viability.

Regarding PT-SCH suitability, we knew from the very beginning that it wouldn't be competitive at this small scale. There are a lot of factors that increase the cost ratio (monitoring and project costs, small scale absorption machine, etc).

However, it's very important to be able to quantify how all these issues affect to the viability of the system.

Even though the solution is not the most cost efficient, considering the innovative approach, the Project could make the decision to boost one or two installations, in order to have demonstrative units that might encourage other projects in a more suitable system scale.

However, in order to minimize the risks, and avoid failed experiences, we only should select locations and users totally committed with the O&M of these demonstrative units.

Only Alexandria University has been included at the final selection list. They offer a representative building and a strong commitment from the university to boost and maintain the system.

Matrouh governorate building, was considered too risky, in terms of building loads and future O&M.

BAU has an interesting candidate building, with big cooling demand. However, the partner and the institution doesn't seem to feel comfortable with the decision.

- PV "cooling" might be an interesting alternative for Matrouh Governorate and Matrouh Hospital buildings, in other to offer an alternative to the proposed SCH.

By retrofitting the existing cooling system (highly efficient Heat Pump) and integrating a PV pergola at the roof top, visible and useful to the visitors and building users.

Even though is available in the market, this technological option has to be further detailed in terms of equipment selection and costs.

-Parabolic Trough for electricity generation (dish stirling or turbine) was finally discarded due to the lack of cost efficient solutions in the market at this small scale.

1.3.2 System dimensions

- BIPV systems are the ones more flexible in terms of system dimension.

A wide range of systems sizes will be implemented: from 2,5 kWp to 45 kWp

Technolgy	Power/system (kWp)	N systems (25)
BIPV	**2.5-45 kWp**	**21**
	2,5-5 kWp	6
	5-10 kWp	7
	10-20 kWp	6
	20-45 kWp	2
PV cooling*	10-20 kW*	2*
Dish Stirling	**4**	**3**
Parabolic Trough-SCH	**17,1**	**1**

**PV cooling KW are not included in the total amount, since they are already considered as BIPV kW*

1.3.3 Type of application:

- Depending on the building interaction, there's a range of type of applications:

Type of application	Installed power (kWp)	N systems (25)
BIPV		**21**
Pergola (outdoors)	136.5 kWp	10
Canopy/ brise-soleil (façade)	57.5 kWp	4
Skylight (building interaction)	35 kWp	5
Roof integrated (flex TF)	17.3 kWp	2
PV cooling*	10-20 kW*	2*
Dish Stirling		**3**
DS ground mounted		2
DS roof mounted		1
Parabolic Trough-SCH (roof)	**17,1**	**1**

1.4 Budget aligning

The technical team and technological centers preliminary researches leaded to a table of technology costs (See Report 5, Costs study), which have been used to define the system dimensioning and budget suitability. However, system costs will be totally defined after the procurement process (tender).

The following table shows the budget distribution, in terms of "infrastructures" and "services", which is quite aligned with the initial forecast.You can find the "infrastructures and services" break down at the annex documents: *"BIPV_costs_140417"; "DS_costs_140407"; "PT-SCH_costs_140407"*

BIPV (10 kWp)		*4,75 €/Wp*	*4,25 €/Wp*	*3,5 €/Wp*
Infrastructures (3.2.-3.7. budget lines)	65-60%	**31.000 €**	**26.000 €**	**21.000 €**
PV modules; Inverters; Monitoring system				
Services (6.15.-6.20. budget lines)	35-40%	**16.500 €**	**16.500 €**	**14.000 €**
Dish Stirling (1 kWe + 3 kWt)		*9,4*	*10,03*	
Infrastructures (3.2.-3.7. budget lines)	61%	**23.120 €**	**23.120 €**	
DS system pack: solar field; power block; control				
Services (6.15.-6.20. budget lines)	39%	**14.490 €**	**16.990 €**	
Parabolic Trough - Solar Cooling Heating (17,1 kWc)		*8,03*		
Infrastructures (3.2.-3.7. budget lines)	62%	**85.457 €**		
PT solar field (whole pack); absorption machine; heat exch; control				
Services (6.15.-6.20. budget lines)	38%	**51.844 €**		
PV cooling		*6,75*	*to be analysed*	
Infrastructures (3.2.-3.7. budget lines)				

Preliminary cost estimations present a margin of deviation from the assigned Project Budget (lines 6.15-6.20; 3.3-3.7) of approximately -15% / +11%.

Part of the Services expenses could be compensated with the budget line "Experts, services (6.9-6.14)". This option would give a 14% extra, that could be justified in terms of engineering, legalization, commissioning, monitoring, etc.; though some of the partners already expended part of this budget.

Cost estimation include transportation but NOT taxes and duties. It's is extremely important to identify and quantify them.

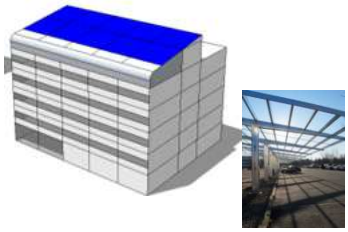
2. BUILDING SELECTED, AND SOLAR-SYSTEMS APPROVED FOR IMPLEMENTING IN EACH ONE

2.1 Mediterranean Region of Ditiki-Ellade, Greece - P1: AEIPLOUS

2.1.1 Public buildings selected, out of the pre-selected.

'pb' pre-selected buildings	Solar Renewable that would be installed	Power (kW)	Estimated cost (€)
1. University of Patras building in Agrino	A) BIPV: glass laminated crystalline. Roof pergola	6	104.580 €
	B) BIPV: glass laminated crystalline. Car shelter	15	
2. Town hall building in Amfilochia	A) BIPV: glass laminated crystalline. SW façade	11,30	99.600 €
	B) BIPV: glass laminated crystalline. Roof	8,70	
3. Patras science park	A) BIPV: glass laminated crystalline. Roof pergola	**7,80**	**91.830 €**
	B+C) BIPV: EFTE Car shelter	**7,20**	
	D) BIPV: glass laminated crystalline Skylight	**6,00**	
'b' Selected buildings	**N. 1**	**21 kWp**	**104.580 €**

2.1.2 Description of the selected building/s, and solar-system scheduled.

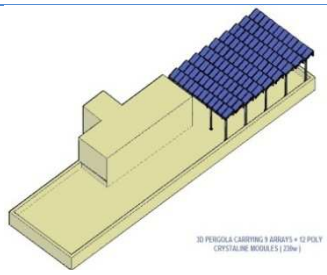
(3) University of Patras - Building in Agrinio (University of Patras, AEIPLOUS)			
Building data	• Location: • Ownership: • Use: • Building surface: • Electricity consumption:	**University Campus in Agrinio, Greece** **University of Patras** **Offices, classrooms, laboratories** **2,400 m² (approx.)** **417,600 kWh (approx.)**	
Solar Energy System	• System application: • PV module technology: • Installed power: • Electricity production: • Estimated surface:	**BIPV integration, Skylight & Car shelter** **Semi-transparent_glass-laminated crystalline modules** **21 kWp** **30,000 kWh/year (approx.)** **200 m²**	
Objectives & Opportunities	• The building has an excellent visibility in the campus. University community and external visitors will be able to learn from the experience. • The façade of the building will be substantially improved. Entrance of the building will be weather protected and humidity sealed. The installation may improve thermal comfort in summer time providing a pleasant level of natural light in the underneath offices. • Solar parking lots are expected to draw enormous attention by the visitors due to the appearance and the utility of the application. It is expected to drive into the implementation of numerous similar applications. • Local authorities will be familiarized with dealing and licensing similar applications facilitating the expansion of the sector.		

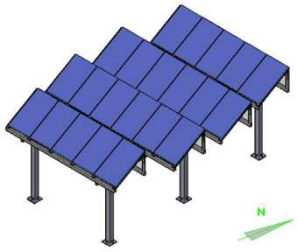
2.2 Mediterranean Region of Marsa Matrouh, Egypt – P2: EAEE

2.2.1 Public buildings selected, out of the pre-selected ones.

'pb' pre-selected buildings	Solar Renewable that would be installed	Power (kW)	Estimated cost (€)
1.Governorate building	BIPV-glass laminated semitransparent crystalline	24.2	163,600
2.Local assembly	BIPV-glass laminated semitransparent a-Si thin film	10	42,500
3.Children hospital	BIPV-glass laminated semitransparent a-Si thin film	10	42,500
4.Education faculty	BIPV-glass laminated semitransparent crystalline	5	23,750
5.MIELS school	BIPV-glass laminated semitransparent crystalline	5	23,750
6.Negila hospital	BIPV-glass laminated semitransparent a-Si thin film	10	42,500
7.Sidi Barani hospital	BIPV-glass laminated semitransparent a-Si thin film	10	42,500
8.Matrouh general hospital	BIPV-glass laminated semitransparent a-Si thin film	30	127,500
9.Matrouh public library	BIPV- flexible thin film	20	99,000
'b' Selected buildings	**N. 1, 5, 8, 9**	**79,2 kWp**	**413.600 €**

2.2.2 Description of the selected building/s, and solar-system scheduled.

(1) Governorate of Matrouh Building			
Building data	• Location: • Ownership: • Use: • Building surface: • Electricity consumption:	**El Cornish Street, Matrouh** **Governorate of Matrouh** **Offices** **3,200 m² (approx.)** **525,000 kWh (approx.)**	
Solar Energy System	• System application: • PV module technology: • Installed power: • Electricity production: • Estimated surface:	**BIPV integration, Pergola** **semi-transparent glass-laminated crystalline modules + Cooling system** **44.4 kWp** (20 kW cooling) **73,742 kWh/year (approx.)** **560 m²**	
Objectives & Opportunities	• It was agreed with the Matrouh Governorate to generate PV cooling in the offices of the third floor where no A\C units exists. Implementing PV cooling will be the first Solar application in the region • The building has an excellent visibility in the city. Local SMEs active in the field of RES will get experience from the operation of these innovative solar technologies and will be able to support them in the future		

(5) M.E.I.L.S School Building (Governorate of Matrouh)			
Building data	• Location: • Ownership: • Use: • Building surface: • Electricity consumption:	**El Cornish Street, Matrouh** **Governorate of Matrouh** **Offices, labs** **1,240 m² (approx.)** **23,623 kWh (approx.)**	
Solar Energy System	• System application: • PV module technology: • Installed power: • Electricity production: • Estimated surface:	**BIPV integration, Pergola** **semi-transparent glass-laminated crystalline modules** **5,06 kWp** **8,393 kWh/year (approx.)** **64.86 m²**	
Objectives & Opportunities	• The operation of the system will give the opportunity to students to increase their awareness of the importance of solar energy • The installation and operation of the systems will give the opportunity to post graduate students to do research and write dissertations about these technologies. • Various local schools and stakeholders will be informed through seminars and newsletters about these innovative solar technologies and their possible future uses.		

(8) Matrouh general hospital (Governorate of Matrouh)

Building data

- Location: **Alexandria Street, Matrouh**
- Ownership: **Governorate of Matrouh**
- Use: **Health care centre**
- Building surface: **11,520 m² (approx.)**
- Electricity consumption: **978,276 kWh (approx.)**

Solar Energy System

- System application: **BIPV integration, Pergola**
- PV module technology: **semi-transparent glass-laminated a-Si thin film modules**
- Installed power: **20 kWp**
- Electricity production: **33,173 kWh/year (approx.)**
- Estimated surface: **344 m²**

Objectives & Opportunities

- Installed PV system generates electricity and cooling
- The roof surface and orientation are suitable and a primary substructure as pergolas, is required where 333 units of thin film modules will be installed over 12 pergolas having 2.8 meter height each
- Local SMEs active in the field of RES will get experience from the operation of these innovative solar technologies and will be able to support them in the future.

(9) Culture Center (Governorate of Matrouh)

Building data

- Location: **El Cornish Street, Matrouh**
- Ownership: **Governorate of Matrouh**
- Use: **Culture center**
- Building surface: **1,300 m² (approx.)**
- Electricity consumption: **The library will be inaugurated on Sep.2014**

Solar Energy System

- System application: **BIPV integration, Pergola**
- PV module technology: **ETFE laminated flexible thin film (a-Si) modules**
- Installed power: **10 kWp**
- Electricity production: **16,586 kWh/year (approx.)**
- Estimated surface: **223 m²**

Objectives & Opportunities

- The building permanent loads still not identified as the library will be officially inaugurated on Sept 2014

  The roof surface and orientation are suitable and a primary substructure as steel sheet is required which will be covered by 74 units of flexible thin film modules (5.4 x 0.4m) .
- Local SMEs active in the field of RES will get experience from the operation of these innovative solar technologies and will be able to support them in the future.

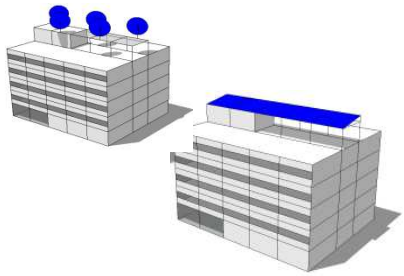
2.3 Mediterranean Region of Alt-Salt & Irbid, Jordan - P3: BAU

2.3.1 Public buildings selected, out of the pre-selected ones.

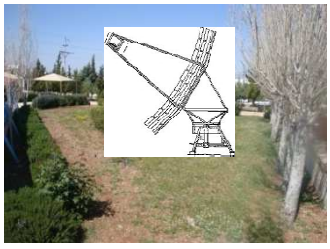
'pb' pre-selected buildings	Solar energy system that would be installed	power (kW)	Estimated cost (€)
1.Science Building (BAU)	BIPV-glass laminated semi-transparent crystalline- curvilinear Canopy	24	114,000€ (122.500 €)
2. Engineering Building (BAU)	BIPV-glass laminated semi-transparent crystalline	4	19.000 €
3.Scientific Research Deanship (BAU)	BIPV-glass laminated semi-transparent crystalline- Façade	3	14,000€
4. Main Library	PT-SCH	17	140,000 €
5. (5-6) Engineering Workshop (BAU)	Stirling Dish	4	44,000 € (44.550 €)
6. (5-6) Finance building (BAU)	BIPV- glass laminated semi-transparent crystalline- Façade brise-Soleil	15	71,000€ (75.000 €)
7.(7-8) Engineering Workshop (HUC)	A) BIPV-flexi Thin film (3,5 €/Wp?)	3.5 (-3,5?)	16,150€ (12.250 €)
	B) Stirling Dish	4	45,000 € (44.550 €)
8. (7-8) Bairooni Building (HUC)	a) BIPV-glass laminated semi-transparent crystalline- Canopy	20 (+4,2 kWp)	95,000€ (121.000 €)
9.Main building(HUC)	BIPV- glass laminated semi-transparent crystalline- Façade brise-Soleil	8	39,000€ (40.000 €)
'b' Selected buildings	**1+5; 6; 7; 8; 9**	**78.5kWp (+0,7kWp)**	**425,000 € (447.600 €) (418.420 €)**

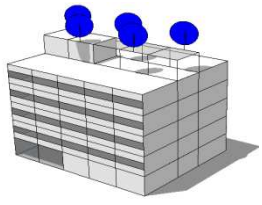
2.3.2 Description of the selected building/s, and solar-system scheduled.

(1) Science building and Engineering workshop (Al-Balqa Applied University, BAU)		
Building data	• Location:	**BAU campus in Al-Salt, Jordan**
	• Ownership:	**BAU university**
	• Use:	**Offices, classrooms, laboratories, Workshop**
	• Building surface:	**6,755 m² (approx.)**
	• Electricity consumption:	**525,000 kWh (approx.)**
Solar Energy System	• System application:	**BIPV integration, Skylight** **Dish Stirling roof mounted**
	• PV module technology:	**semi-transparent glass-laminated** **crystalline modules**
	• Installed power:	**24 kWp**
	• Electricity production:	**37,000 kWh/year (approx.)**
	• Estimated surface:	**186 m²**
Objectives & Opportunities	• The building has an excellent visibility in the campus. University community and external visitors will be able to learn from the experience. • The roof presents different orientations and inclinations that can be optimized with a proper design, control and management system. • New semi-transparent PV modules will optimize the solar gains, improving the thermal comfort in summer time, and maintaining a good level of natural light in the building court.	



(5; 5-6) Engineering Workshop (Al-Huson University College, HUC)		
Building data	• Location:	**HUC campus in Irbid, Jordan**
	• Ownership:	**HUC**
	• Use:	**offices, classrooms, Workshop**
	• Building surface:	**1300 m² (approx.)**
	• Electricity consumption:	**108,000 kWh (approx.)**
Solar Energy System	• System application:	**BIPV integration, thin film** **Dish Stirling, ground mounted**
	• PV module technology:	**ETFE laminated flexible thin film (a-Si)**
	• Installed power:	**11.7 kWp**
	• Electricity production:	**19,000 kWh/year (approx.)**
	• Estimated surface:	**50 m²**
Objectives & Opportunities	• The building has an excellent visibility in the campus. The technical community college students and external visitors will be able to learn from the experience. • The college is the only academic institute in Jordan who teaches a Solar Technology program and thus it would be a great opportunity for students to practice and study such a technology. • These models will be the first model to be install in Jordan as these technologies are never been applied in Jordan.	





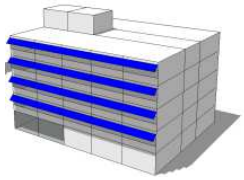
(6) Finance Building (Al-Balqa Applied University, BAU)

Building data

- Location: **BAU campus in Al-Salt, Jordan**
- Ownership: **BAU university**
- Use: **offices,**
- Building surface: **4000 m² (approx.)**
- Electricity consumption: **240,000 kWh (approx.)**

Solar Energy System

- System application: **BIPV integration, façade brise-soleil**
- PV module technology: **semi-transparent glass-laminated crystalline modules**
- Installed power: **19 kWp**
- Electricity production: **30,000 kWh/year (approx.)**
- Estimated surface: **178 m²**



Objectives & Opportunities

- The building has an excellent visibility in the campus and from outside as it is close to the ring road. University community, external visitors and local community will be able to learn from the experience.
- The building is Grid connected and thus there will be no waste at weekend and holidays
- The owner has local expertise in PV installation and maintenance

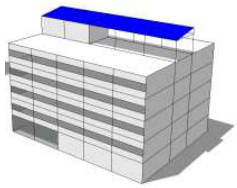
(8; 7-8) Bairooni Building (Al-Huson University College, HUC)

Building data

- Location: **HUC campus in Irbid, Jordan**
- Ownership: **HUC**
- Use: **offices, classrooms,** labs, restaurant
- Building surface: **3,300 m² (approx.)**
- Electricity consumption: **168,000 kWh (approx.)**

Solar Energy System

- System application: **BIPV integration, ground pergola**
- PV module technology: **semi-transparent glass-laminated crystalline modules**
- Installed power: **24 kWp**
- Electricity production: **38,000 kWh/year (approx.)**
- Estimated surface: **222 m²**



Objectives & Opportunities

- The building is a new building and the system is located at high student and staff traffic and also it is close to a mosque and thus it has an excellent visibility in the campus. University community and external visitors will be able to learn from the experience.
- The system will have great educational benefit for solar student who are studying at HUC Campus.

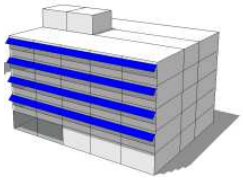
(9) Main building (Al-Huson University College, HUC)

Building data

- Location: **HUC campus in Irbid, Jordan**
- Ownership: **HUC**
- Use: **offices, classrooms,** labs
- Building surface: **8,500 m² (approx.)**
- Electricity consumption: **680,000 kWh (approx.)**

Solar Energy System

- System application: **BIPV integration, façade brise-soleil**
- PV module technology: **semi-transparent_glass-laminated crystalline modules**
- Installed power: **10 kWp**
- Electricity production: **15,500 kWh/year (approx.)**
- Estimated surface: **93 m²**



Objectives & Opportunities

- The building is located infront of the student registration department and so it has an excellent visibility to students, parents and external visitors who will be able to learn from the experience.
- The building is facing south with no obstacles and this it has an excellent orientation and it will be a great example for building integration systems.

2.4 Mediterranean Region of Alexandria, Egypt - P4: AU

2.4.1 Public buildings selected, out of the pre-selected ones.

'pb' pre-selected buildings	Solar energy system that would be installed	power (kW)	Estimated cost (€)
1. **Faculty of Science "FoS", AU.** MoharamBek "MB" campus	A) BIPV-glass laminated semi-transparent thin film	5	21250€ (4.25€/W)
2. **Administration building, FoS, AU, MB campus**	A) PTSC(6000 € discount for one PT row)	17 .1	137,313€ (8.03€/W) 131,313 € (7.68 €/W)
	B) BIPV-flexible thin film	2.5	8,750 € (3.5€/W)
3. **Faculty of Science "FoS", AU.** El-Shatby "ES" campus	A) BIPV-glass laminated semi-transparent thin film	15	63,750 € (4.25€/W)
4. Faculty of Engineering "FoE", AU.	A) BIPV-flexible thin film	10	35,000 (3.5 €/W)
5. SIDPEC administration building	A) BIPV-glass laminated semi-transparent thin film	10	42,500 (4.25€/W)
'b' selected buildings	1, 2 & 3	39.6 kWp	231,063 € (225,063 €)

2.4.2 Description of the selected building/s, and solar-system scheduled.

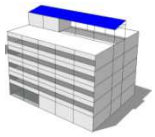
(1) Faculty of Science, (Alexandria University, AU)

Building data

- Location: **Moharam Bek Campus, Alexandria, Egypt**
- Ownership: **Alexandria University**
- Use: **Offices, classrooms, laboratories**
- Building surface: **14,965 m²**
- Electricity consumption: **579,744 kWh (annual approx.)**

Solar Energy System

- System application: **BIPV, garden pergola**
- PV module technology: **semi-transparent glass-laminated thin film modules**
- Installed power: **5 kWp**
- Electricity production: **7,000 kWh/year (approx.)**
- Estimated surface: **60 m² (approx.)**



Objectives & Opportunities

- The pergola to be constructed in a location with excellent visibility inside the campus.
- The pergola will be designed to face south with suitable inclination to maximize the output generated electricity.
- New semi-transparent PV modules will enable a good level of sunlight for a magnificent pergola design to be used as a cafeteria area in summer and winter for students and faculty staff.
- University community and external visitors will be able to learn from the experience.

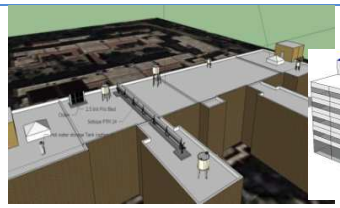
(2) Administration building, Faculty of Science, (Alexandria University, AU)

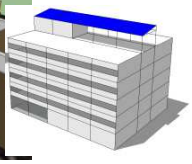
Building data

- Location: **Moharam Bek Campus, Alexandria, Egypt**
- Ownership: **Alexandria University**
- Use: **Offices, classrooms, laboratories**
- Building surface: **5,850 m²**
- Electricity consumption: **208,494 kWh (annual approx.)**

Solar Energy System

- System application: **PT-SCH + BIPV pergola**
- Technology: **Parabolic trough SCH + laminated flexible thin film modules**
- Installed power: **17.1 kWt + 2.5 kWp**
- Electricity production: **3,500 kWh/year (approx.)**
- Estimated surface: **140+ 60 m² (approx.)**





Objectives & Opportunities

- A combined system (zero energy system) which integrates a SCH system for air cooling and heating plus PV pergola to generate electricity
- SCH as a new technology will be installed in Alexandria for the first time. Therefore it is a very good opportunity to introduce the technology to the market as well as the public.
- SCH system will be used for air cooling(summer) and heating(winter) for some offices and classrooms in addition to supplying hot water for bathrooms in the winter.
- The PV pergola will be used to shade the chiller and to generate electricity for SHC system to work as a standalone system
- The pergola will be designed to face south with suitable inclination to maximize the output generated electricity.
- University community and external visitors will be able to learn from the experience

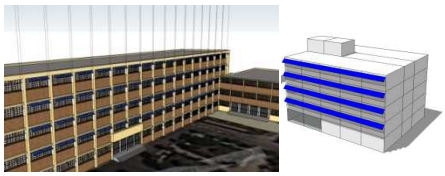
(3) Building "A", Faculty of Science, (Alexandria University, AU)

Building data

- Location: **El-Shatby Campus, Alexandria, Egypt**
- Ownership: **Alexandria University**
- Use: **Offices, classrooms, laboratories**
- Building surface: **8,190 m²**
- Electricity consumption: **342,833 kWh (annual approx.)**

Solar Energy System

- System application: **BIPV façade brise-soleil**
- Technology: **semi-transparent glass-laminated crystalline modules**
- Installed power: **15 kWp**
- Electricity production: **20,000 kWh/year (approx.)**
- Estimated surface: **130 m² (approx.)**



Objectives & Opportunities

- The façade brise-soleil modules will be visible almost from any location inside the campus.
- The facade brise-soleil BIPV installation is new to Egypt.
- The modules will face SE direction at inclination of 30° which will allow high efficiency of electricity production.
- New semi-transparent PV modules will shade building windows from direct sunlight while maintaining a good level of natural light inside the building.
- University community and external visitors will be able to learn from the experience.

2.5 Mediterranean Region of Creete, Greece - P5: MAICh

2.5.1 Public buildings selected, out of the pre-selected ones..

'pb' pre-selected buildings	Solar energy system that would be installed	power (kW)	Estimated cost (€)
1. M.A.I.Ch. campus	A) BIPV: (skylight semitransp. crystalline)	5	25.000 €
	B) BIPV (skykight semiptransp. thin film)	8.2	34.030 €
2.Kolymbari	BIPV	13.2	26,000 €
3. NeaChora	BIPV	13.2	26,400 €
'b' Selected buildings	**N. 1**	**13.2 kWp**	**56.000 €** *** 59.030 €**

2.5.2 Description of the selected building/s, and solar-system scheduled.

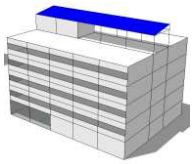
(1) MAICh campus, Conference Centre (MAICh, Chania)

Building data

- Location: **MAICH campus in CHANIA, GR**
- Ownership: **GREEK MINISTRY OF RURAL DEVELOPMENT AND FOOD**
- Use: **CONFERENCE CENTRE**
- Building surface: **11,200 m² (approx.)** **Including the Academic facilities**
- Electricity consumption: **965,200 kWh (approx.)**

Solar Energy System

- System application: **BIPV integration, Skylight**
- PV module technology: **_semi-transparent_glass-laminated crystalline modules (2)** **_Thin film, a-Si modules (1)**
- Installed power: **3.7 kWp + 6.9 kWp + (TF) 3.2 kWp**
- Electricity production: **51,800 + 96,600 + 43,200 + kWh/year (approx.)**
- Estimated surface: **39 m² + 73.5 m² + (TF) 72m²**



Objectives & Opportunities

- The building has an excellent visibility in the campus. University community and external visitors will be able to learn from the experience.
- The roof presents different orientations and inclinations that can be optimized with a proper design, control and management system.
- New semi-transparent PV modules will optimize the solar gains, improving the thermal comfort in summer time, and maintaining a good level of natural light in the building court.

2.6 Mediterranean Region of Catalonia, Spain - P6: EsE, & Ben: UAB-BEG

2.6.1 Public buildings selected, out of the pre-selected ones.

'pb' pre-selected buildings	Solar energy system that would be installed	power (kW)	Estimated cost (€)
1. ICM	A) BIPV - Pergola Glass laminated semitransparent - Crystalline	9.540 kWp	46.078,20 €
2. HOUSING AGENCY	A) BIPV - Skylight Glass laminated semitransparent - Crystalline	2,160 kWp	10.432,80 €
	B) BIPV - Roof ETFE laminated flexible - Thin Film	7,437 kWp	26.624,46 €
3. OFFICE AMB	A) BIPV - Facade Glass laminated semitransparent - Crystalline	9,873 kWp	47.686,59 €
4. MOLLET HOSPITAL	A) BIPV - Canopy Glass laminated semitransparent - Crystalline	9,817 kWp	47.416,11 €
5. ECO PARC (ECO2)	A) Dish Stirling Cogeneration system: 1 kWe+3 kWt	4,000 kWp	37.920,00 €
6. SCHOOL Sant Cugat			
'b' selected buildings	**N. 2, 4, 5, 6**	**33,287 kWp**	**170.079,96 €**

2.6.2 Description of the selected building/s, and solar-system scheduled.

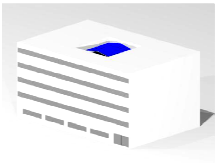
(2) Housing Agency of Catalonia (Government of Catalonia, EsE-UAB)

Building data

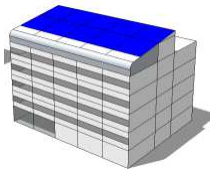
- Location: **Barcelona, Spain**
- Ownership: **Government of Catalonia**
- Use: **Offices**
- Building surface: **5,328 m² (approx.)**
- Electricity consumption: **680,549 kWh/y (approx.)**

Solar Energy System

- System application: **BIPV integration, Skylight**
- PV module technology: **Semi-transparent Glass Crystalline**
- Installed power: **2.6 kWp**
- Electricity production: **3,051.52 kWh/year (approx.)**
- Estimated surface: **23.8 m²**



- System application: **BIPV integration, Roof Top**
- PV module technology: **Flexible Thin Film**
- Installed power: **7.4 kWp**
- Electricity production: **9,420.2 kWh/year (approx.)**
- Estimated surface: **116.6 m²**



Objectives & Opportunities

- The Housing Agency of Catalonia is part of the European project "MARIE", as DIDSOLIT-PB is, too. Here's another great opportunity to generate positive synergies and to multiply the impact of our work.
- The skylight presents two different orientations that can be optimized with a proper design, control and management system.

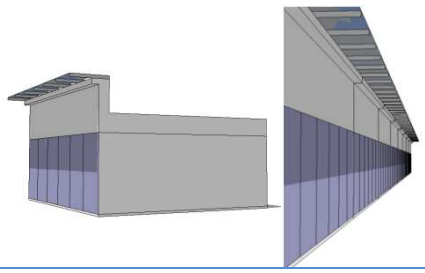
(4) Mollet Hospital (Mollet Health Foundation, EsE-UAB)

Building data

- Location: **Mollet del Vallés, Spain**
- Ownership: **Mollet Health Foundation**
- Use: **Hospital and Offices**
- Building surface: **22,182 m² (approx.)**
- Electricity consumption: **7,604,161 kWh/y (approx.)**

Solar Energy System

- System application: **BIPV integration, Canopy**
- PV module technology: **Semi-transparent Glass Crystalline**
- Installed power: **13.5 kWp**
- Electricity production: **15,142.92 kWh/year (approx.)**
- Estimated surface: **154.4 m²**



Objectives & Opportunities

- Mollet Hospital is a center run by the Health Foundation Mollet, an activity that began on July 31st , 2010. Based on efficient and sustainable design, the building is currently using geothermal heat pumps.
- Mollet Hospital is part of an international network "GREEN HOSPITAL". There's a great opportunity to generate positive synergies with this initiative.
- The BIPV is based a canopy placed on the cafeteria roof along the south facade of the building. It will be designed to not only increase shade inside cafeteria but to reduce cooling needs during the summer months.

(5) SCHOOL CATALUNYA (Sant Cugat Council, EsE-UAB)

Building data

- Location: **Sant Cugat, Spain**
- Ownership: **Sant Cugat Council**
- Use: **Primary and Secondary School**
- Building surface: **_____ m² (approx.)**
- Electricity consumption: **_____kWh/y (approx.)**

Solar Energy System

- System application: **BIPV integration, Pergola**
- PV module technology: **Semi-transparent Glass Crystalline**
- Installed power: **5.5 kWp**
- Electricity production: **6,624 kWh/year (approx.)**
- Estimated surface: **52.64 m²**

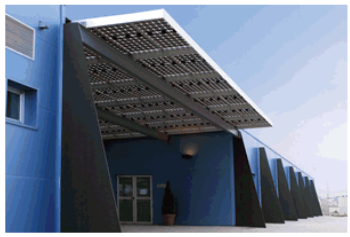
Objectives & Opportunities

- A great Visibility and Dissemination expectation, the building is a public school located around a big community.
- Great dissemination of BIPV technology by the public entity thanks to collaborate with the environmental education department of public entity.
- The operation of the system will give the opportunity to students to increase their awareness of the importance of solar energy

(6) Eco Park 2 (ECO2) (Area Metropolitana de Barcelona, EsE-UAB)

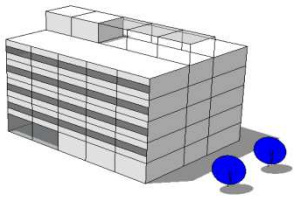
Building data

- Location: **Montcada i Reixac, Spain**
- Ownership: **Area Metropolitana of Barcelona**
- Use: **Plant treatment of urban waste**
- Building surface: **110,000 m² (approx.)**
- Electricity consumption: **17,503,661 kWh/y (approx.)**



Solar Energy System

- System application: **Dish Stirling - Cogeneration**
- Module technology: **Dish Parabolic**
- Installed power: **1 kW electric**
  3 kW thermal
- Electricity production: **2,199.2 kWeh/year (approx.)**
  6,861.9 kWth/year (approx.)
- Estimated surface: **11 m²**



Objectives & Opportunities

- Offering great Visibility and Dissemination opportunities, the building is located amongst a number of industries and is sure to attract attention. In addition, the Unit will form part of an environmental school visit, which the public entity organizes.
- This building has other renewable facilities, such as biogas, photovoltaic and a boasts a solid track record of performance and maintenance over these systems.

3. EXPECTED COSTS AND BUDGET-AVAILABILITY VERIFICATION

3.1 Partners / buildings / scheduled solar-systems / and Costs forecast

		name	application	Technology installed power							Total €		
				total kW	crystalline semitrans	BIPV thin film semitrans	flexible thin film	PV cooling	DS (1kWe/3kWt)	PT-SCH	Initial budget (3.2-3.7) + (6.16-6.20)	Cost Forecast	
				136,5	69,2%	10,2%	10,0%		4,4%	6,2%			
				35,0	14	3	4						
Total				275,4 kWp	190,6 kWp	28,2 kWp	27,5 kWp	30,0 kWc	12,0 kW	17,1 kWc	1.421.465 €	1.410.391 €	-0,8%
	1_P	University of Patras, Agrino	BIPV: car park pergola, crystaline	15,5 kWp	15,5 kWp							73.625 €	
	1_S	University of Patras, Agrino	BIPV: skylight, crystaline	5,5 kWp	5,5 kWp							26.125 €	
P1. AEIPLOUS	1	University of Patras, Agrinio	BIPV: roof pergola, cryst / car shelter, thin film / skylight, flex tf	21,0 kWp	21,0 kWp						101.472 €	99.750 €	-1,7%
	2	Governorate building	BIPV: roof pergola, crystalline / PV cooling (10 kW)	44,4 kWp	44,4 kWp			20,0 kWc				234.360 €	
	3	MEILS school	BIPV: garden pergola, crystalline	5,0 kWp	5,0 kWp							26.250 €	
	4	Matrouh general hospital	BIPV: roof pergola, thin film	20,0 kWp		20,0 kWp		10,0 kWc				96.730 €	
	5	Matrouh culture center	BIPV: roof, flexible thin film	10,0 kWp			10,0 kWp					45.000 €	
P2. EAEE				79,4 kWp	49,4 kWp	20,0 kWp	10,0 kWp	30,0 kWc			433.290 €	402.340 €	-7,7%
	6	Science building-Eng workshop	BIPV: skylight, crystaline / Dish stirling, roof top	24,0 kWp	20,0 kWp				4,0 kW			139.410 €	
	7	Finance building	BIPV: façade brise-soleil, crystalline	19,0 kWp	19,0 kWp							90.250 €	
	8	Engineering workshop (HUC)	BIPV: pergola, flexible thin film / Dish Stirling, ground mounted	11,7 kWp			7,7 kWp		4,0 kW			68.090 €	
	9	Barooni building	BIPV: ground pergola, crystalline	24,0 kWp	24,0 kWp							114.000 €	
	10	Main building	BIPV: façade brise-soleil, crystalline	10,0 kWp	10,0 kWp							47.500 €	
P3. BAU				88,7 kWp	73,0 kWp	0,0 kWp	7,7 kWp		8,0 kW		433.290 €	459.250 €	5,7%
	11	Faculty of Science "FoS", MB campus	BIPV: garden pergola, thin film	5,0 kWp		5,0 kWp						21.250 €	
	12	Administration building, FoS	PT-SCH: roof top, one PT row / BIPV: pergola, flexible thin film	19,6 kWp			2,5 kWp			17,1 kWc		140.051 €	
	13	Faculty of Science, "A" "FoS", ES campus	BIPV: façade brise-soleil, crystalline	15,0 kWp	15,0 kWp							71.250 €	
P4. AU				39,6 kWp	15,0 kWp	5,0 kWp	2,5 kWp			17,1 kWc	216.645 €	232.551 €	6,8%
	14_S1	MAICh campus, Chania	BIPV: skylight, crystaline	3,7 kWp	3,7 kWp							17.575 €	
	14_S2	MAICh campus, Chania	BIPV: Pergola, crystaline	6,9 kWp	6,9 kWp							32.775 €	
	14_S3	MAICh campus, Chania	BIPV: skylight, semitransparent thin film	3,2 kWp		3,2 kWp						12.480 €	
P5. MAICh	14	MAICh campus	BIPV: roof pergola, crystalline	13,8 kWp	10,6 kWp	3,2 kWp			0,0 kW		67.648 €	66.280 €	-2,1%
	15	Housing Agency of Catalunya	BIPV: skylight, crystaline / BIPV: roof top, flexible thin film	9,9 kWp	2,6 kWp		7,3 kWp					31.960 €	
	16	Mollet Hospital	BIPV: canopy, crystaline	13,5 kWp	13,5 kWp							56.025 €	
	17	Primary School, Sant Cugat	BIPV: garden pergola, crystalline	5,5 kWp	5,5 kWp							22.825 €	
	18	ECO2	Dish Stirling, ground mounted	4,0 kWp					4,0 kW			39.410 €	
p6. EsE-UAB				32,9 kWp	21,6 kWp	0,0 kWp	7,3 kWp		4,0 kW		169.120 €	150.220 €	-12,6%

3.2 Partners / buildings / scheduled solar-systems / Costs forecast / and Budget availabilities

		name	Technology installed power: total kW	crystalline semitrans	BIPV thin film semitrans	flexible thin film	PV cooling	DS (1kWe/3 kWt)	PT-SCH	Total € Initial budget (3.2-3.7) + (6.16-6.20)	Infrastructures Initial Budget (3.2-3.7)	Services Initial Budget (6.15-6.20)	Experts, Serv Initial budget (6.9-6.14)
				14	3	4							
				69,2%	10,2%	10,0%		4,4%	6,2%				
Total			**275,4 kWp**	**190,6 kWp**	**28,2 kWp**	**27,5 kWp**	*30,0 kWc*	**12,0 kW**	**17,1 kWc**	**1.421.465 €**	**907.125 €**	**514.340 €**	**166.330 €**
	1_P	University of Patras, Agrino	15,5 kWp	15,5 kWp									
	1_S	University of Patras, Agrino	5,5 kWp	5,5 kWp									
P1. AEIPLOUS	**1**	**University of Patras, Agrinio**	**21,0 kWp**	**21,0 kWp**						**101.472 €**	**68.108 €**	**33.365 €**	**10.000 €**
	2	**Governorate building**	44,4 kWp	44,4 kWp			*20,0 kWc*						
	3	**MEILS school**	5,0 kWp	5,0 kWp									
	4	**Matrouh general hospital**	20,0 kWp		20,0 kWp		*10,0 kWc*						
	5	**Matrouh culture center**	10,0 kWp			10,0 kWp							
P2. EAEE			**79,4 kWp**	**49,4 kWp**	**20,0 kWp**	**10,0 kWp**	*30,0 kWc*			**433.290 €**	**272.040 €**	**161.250 €**	**40.000 €**
	6	**Science building-Eng workshop**	24,0 kWp	20,0 kWp				4,0 kW					
	7	**Finance building**	19,0 kWp	19,0 kWp									
	8	**Engineering workshop (HUC)**	11,7 kWp			7,7 kWp		4,0 kW					
	9	**Bairooni building**	24,0 kWp	24,0 kWp									
	10	**Main building**	10,0 kWp	10,0 kWp									
P3. BAU			**88,7 kWp**	**73,0 kWp**	**0,0 kWp**	**7,7 kWp**		**8,0 kW**		**433.290 €**	**272.040 €**	**161.250 €**	**60.000 €**
	11	**Faculty of Science "FoS", MB campus**	5,0 kWp		5,0 kWp								
	12	**Administration building, FoS**	19,6 kWp			2,5 kWp			17,1 kWc				
	13	**Faculty of Science, "A" "FoS", ES camp**	15,0 kWp	15,0 kWp									
P4. AU			**39,6 kWp**	**15,0 kWp**	**5,0 kWp**	**2,5 kWp**			**17,1 kWc**	**216.645 €**	**136.020 €**	**80.625 €**	**36.330 €**
	14_S1	**MAICh campus, Chania**	3,7 kWp	3,7 kWp									
	14_S2	**MAICh campus, Chania**	6,9 kWp	6,9 kWp									
	14_S3	**MAICh campus, Chania**	3,2 kWp		3,2 kWp								
P5. MAICh	**14**	**MAICh campus**	**13,8 kWp**	**10,6 kWp**	**3,2 kWp**			**0,0 kW**		**67.648 €**	**45.405 €**	**22.243 €**	**10.000 €**
	15	**Housing Agency of Catalunya**	9,9 kWp	2,6 kWp		7,3 kWp							
	16	**Mollet Hospital**	13,5 kWp	13,5 kWp									
	17	**Primary School, Sant Cugat**	5,5 kWp	5,5 kWp									
	18	**ECO2**	4,0 kWp					4,0 kW					
p6. EsE-UAB			**32,9 kWp**	**21,6 kWp**	**0,0 kWp**	**7,3 kWp**		**4,0 kW**		**169.120 €**	**113.513 €**	**55.608 €**	**10.000 €**

3.3 Partners / buildings / scheduled solar-systems / Costs forecast break down / and matching with budget lines (Infrastructures, Installations Services, and Experts Services)

			Technology installed power						Total €		Infrastructures	Infrastructures Cost		Services	Services Cost Forecast		Experts, Serv
		total kW	crystaline semitrans	BIPV thin film semitrans	flexible thin film	PV cooling	DS (1kWe/3k Wt)	PT-SCH	Initial budget (3.2-3.7) + (6.16-6.20)	Cost Forecast	Initial Budget (3.2-3.7)	Cost Forecast total € Infrastructures & Equipment		Initial Budget (6.15-6.20)	Cost Forecast total € Services		Initial budget (6.9-6.14)
			69,2%	10,2%	10,0%		4,4%	6,2%									
	name		14	3	4												
Total		275,4 kWp	190,6 kWp	28,2 kWp	27,5 kWp	30,0 kWc	12,0 kW	17,1 kWc	1.421.465 €	1.410.391 €	907.125 €	893.515 €	-1,5%	514.340 €	516.876 €	0,5%	166.330 €
	1_P University of Patras, Agrino	15,5 kWp	15,5 kWp							73.625 €		48.050 €			25.575 €		
	1_S University of Patras, Agrino	5,5 kWp	5,5 kWp							26.125 €		17.050 €			9.075 €		
P1. AEIPLOUS	1 University of Patras, Agrinio	21,0 kWp	21,0 kWp						101.472 €	99.750 €	68.108 €	65.100 €	-4,6%	33.365 €	34.650 €	3,7%	10.000 €
	2 Governorate building	44,4 kWp	44,4 kWp			20,0 kWc				234.360 €		161.100 €			73.260 €		
	3 MEILS school	5,0 kWp	5,0 kWp							26.250 €		15.500 €			10.750 €		
	4 Matrouh general hospital	20,0 kWp		20,0 kWp		10,0 kWc				96.730 €		63.730 €			33.000 €		
	5 Matrouh culture center	10,0 kWp			10,0 kWp					45.000 €		31.000 €			14.000 €		
P2. EAEE		79,4 kWp	49,4 kWp	20,0 kWp	10,0 kWp	30,0 kWc			433.290 €	402.340 €	272.040 €	271.330 €	-0,3%	161.250 €	131.010 €	-23,1%	40.000 €
	6 Science building-Eng workshop	24,0 kWp	20,0 kWp				4,0 kW			139.410 €		85.120 €			54.290 €		
	7 Finance building	19,0 kWp	19,0 kWp							90.250 €		58.900 €			31.350 €		
	8 Engineering workshop (HUC)	11,7 kWp			7,7 kWp		4,0 kW			68.090 €		39.290 €			28.800 €		
	9 Bairooni building	24,0 kWp	24,0 kWp							114.000 €		74.400 €			39.600 €		
	10 Main building	10,0 kWp	10,0 kWp							47.500 €		31.000 €			16.500 €		
P3. BAU		88,7 kWp	73,0 kWp	0,0 kWp	7,7 kWp		8,0 kW		433.290 €	459.250 €	272.040 €	288.710 €	5,8%	161.250 €	170.540 €	5,4%	60.000 €
	11 Faculty of Science "FoS", MB campus	5,0 kWp		5,0 kWp						21.250 €		13.000 €			8.250 €		
	12 Administration building, FoS	19,6 kWp			2,5 kWp			17,1 kWc		140.051 €		79.625 €			60.426 €		
	13 Faculty of Science, "A" "FoS", ES campu	15,0 kWp	15,0 kWp							71.250 €		46.500 €			24.750 €		
P4. AU		39,6 kWp	15,0 kWp	5,0 kWp	2,5 kWp			17,1 kWc	216.645 €	232.551 €	136.020 €	139.125 €	2,2%	80.625 €	93.426 €	13,7%	36.330 €
	14_S1 MAICh campus, Chania	3,7 kWp	3,7 kWp							17.575 €		11.470 €			6.105 €		
	14_S2 MAICh campus, Chania	6,9 kWp	6,9 kWp							32.775 €		21.390 €			11.385 €		
	14_S3 MAICh campus, Chania	3,2 kWp		3,2 kWp						12.480 €		8.320 €			4.160 €		
P5. MAICh	14 MAICh campus	13,8 kWp	10,6 kWp	3,2 kWp			0,0 kW		67.648 €	66.280 €	45.405 €	41.180 €	-10,3%	22.243 €	25.100 €	11,4%	10.000 €
	15 Housing Agency of Catalunya	9,9 kWp	2,6 kWp		7,3 kWp					31.960 €		17.450 €			14.510 €		
	16 Mollet Hospital	13,5 kWp	13,5 kWp							56.025 €		33.750 €			22.275 €		
	17 Primary School, Sant Cugat	5,5 kWp	5,5 kWp							22.825 €		13.750 €			9.075 €		
	18 ECO2	4,0 kWp					4,0 kW			39.410 €		23.120 €			16.290 €		
p6. EsE-UAB		32,9 kWp	21,6 kWp	0,0 kWp	7,3 kWp		4,0 kW		169.120 €	150.220 €	113.513 €	88.070 €	-28,9%	55.608 €	62.150 €	10,5%	10.000 €

3.4 Forecast detail: Use of the Infrastructure's budgets

		Technology installed power								Infrastructures	Infrastructures Cost Forecast (3.2 - 3.7)																		
		total kW	crystalline semitrans	BIPV thin film semitrans	flexible thin film	PV cooling	DS (1kWe/3 kWt)	PT-SCH		Initial Budget (3.2-3.7)	Cost Forecast total € Infrastructures & Equipment		L1 crystalline semitrans	L2 thin film semitrans	L3 flexible thin film	L4 inverters + management	L5 monitoring & control PV	L6 dish stirling (/system 1kWe/3kWt)	L7 parabolic trough (/system 17,1 kWc)	L8 absorption chiller + HWp control + H exchanger (17,1 kWc)	L9 extra PV cooling (10 kW HP)	Total PV: L1-L5	Total DS: L6	Total PT: L7-L8	
			69,2%	10,2%	10,0%		4,4%	6,2%					2,50 €/Wp	2,00 €/Wp	1,50 €/Wp	0,35 €/Wp	0,25 €/Wp	23.120 €	42.388 €	37.387 €	11.730 €				
			14	3	4																						
Total		275,4 kWp	190,6 kWp	28,2 kWp	27,5 kWp	30,0 kWc	12,0 kW	17,1 kWc		907.125 €	893.515 €	-1,5%	476.500,00 €	56.400,00 €	51.250,00 €	86.205,00 €	61.575,00 €	69.360,00 €	36.988,00 €	37.387,00 €	35.190,00 €	731.930,00 €	69.360,00 €	74.375,00 €	
	1_P	15,5 kWp	15,5 kWp								48.050 €		38.750 €	- €	- €	5.425 €	3.875 €	- €				48.050 €	- €	- €	
	1_S	5,5 kWp	5,5 kWp								17.050 €		13.750 €	- €	- €	1.925 €	1.375 €	- €				17.050 €	- €	- €	
P1. AEIPLOUS	1	21,0 kWp								68.108 €	65.100 €	-4,6%	52.500 €	- €	- €	7.350 €	5.250 €	- €				65.100 €	- €	- €	
	2	44,4 kWp	44,4 kWp			20,0 kWc					161.100 €		111.000 €	- €	- €	15.540 €	11.100 €	- €			23.460 €	137.640 €	- €	- €	
	3	5,0 kWp	5,0 kWp								15.500 €		12.500 €	- €	- €	1.750 €	1.250 €	- €				15.500 €	- €	- €	
	4	20,0 kWp		20,0 kWp		10,0 kWc					63.730 €		- €	40.000 €	- €	7.000 €	5.000 €	- €			11.730 €	52.000 €	- €	- €	
	5	10,0 kWp			10,0 kWp						31.000 €		- €	- €	25.000 €	3.500 €	2.500 €	- €				31.000 €	- €	- €	
P2. EAEE		79,4 kWp	49,4 kWp	20,0 kWp	10,0 kWp	30,0 kWc				272.040 €	271.330 €	-0,3%	123.500 €	40.000 €	25.000 €	27.790 €	19.850 €	- €	- €	- €	35.190 €	236.140 €	- €	- €	
	6	24,0 kWp	20,0 kWp				4,0 kW				85.120 €		50.000 €	- €	- €	7.000 €	5.000 €	23.120 €				62.000 €	23.120 €	- €	
	7	19,0 kWp	19,0 kWp								58.900 €		47.500 €	- €	- €	6.650 €	4.750 €	- €				58.900 €	- €	- €	
	8	11,7 kWp			7,7 kWp						39.290 €		- €	- €	11.550 €	2.695 €	1.925 €	23.120 €				16.170 €	23.120 €	- €	
	9	24,0 kWp	24,0 kWp				4,0 kW				74.400 €		60.000 €	- €	- €	8.400 €	6.000 €	- €				74.400 €	- €	- €	
	10	10,0 kWp	10,0 kWp								31.000 €		25.000 €	- €		3.500 €	2.500 €	- €				31.000 €	- €	- €	
P3. BAU		88,7 kWp	73,0 kWp	0,0 kWp	7,7 kWp		8,0 kW			272.040 €	288.710 €	5,8%	182.500 €	- €	11.550 €	28.245 €	20.175 €	46.240 €	- €	- €	- €	242.470 €	46.240 €	- €	
	11	5,0 kWp		5,0 kWp							13.000 €		- €	10.000 €	- €	1.750 €	1.250 €	- €				13.000 €	- €	- €	
	12	19,6 kWp			2,5 kWp			17,1 kWc			79.625 €		- €	- €	3.750 €	875 €	625 €	- €	36.988 €	37.387 €		5.250 €	- €	74.375 €	
	13	15,0 kWp	15,0 kWp								46.500 €		37.500 €	- €	- €	5.250 €	3.750 €	- €				46.500 €	- €	- €	
P4. AU		39,6 kWp	15,0 kWp	5,0 kWp	2,5 kWp			17,1 kWc		136.020 €	139.125 €	2,2%	37.500 €	10.000 €	3.750 €	7.875 €	5.625 €	- €	36.988 €	37.387 €	- €	64.750 €	- €	74.375 €	
	14_S1	3,7 kWp	3,7 kWp								11.470 €		9.250 €	- €	- €	1.295 €	925 €	- €				11.470 €	- €	- €	
	14_S2	6,9 kWp	6,9 kWp								21.390 €		17.250 €	- €	- €	2.415 €	1.725 €	- €				21.390 €	- €	- €	
	14_S3	3,2 kWp		3,2 kWp							8.320 €		- €	6.400 €	- €	1.120 €	800 €	- €				8.320 €	- €	- €	
P5. MAICh	14	13,8 kWp	10,6 kWp	3,2 kWp			0,0 kW			45.405 €	41.180 €	-10,3%	26.500 €	6.400 €	- €	4.830 €	3.450 €	- €				41.180 €		- €	
	15	9,9 kWp	2,6 kWp		7,3 kWp						17.450 €		6.500 €	- €	10.950 €	3.465 €	2.475 €	- €				23.390 €	- €	- €	
	16	13,5 kWp	13,5 kWp								33.750 €		33.750 €	- €	- €	4.725 €	3.375 €	- €				41.850 €	- €	- €	
	17	5,5 kWp	5,5 kWp								13.750 €		13.750 €	- €	- €	1.925 €	1.375 €	- €				17.050 €	- €	- €	
	18	4,0 kWp					4,0 kW				23.120 €		- €	- €	- €	- €	- €	23.120 €				- €	23.120 €	- €	
p6. ESE-UAB		32,9 kWp	21,6 kWp	0,0 kWp	7,3 kWp		4,0 kW			113.513 €	88.070 €	-28,9%	54.000 €	- €	10.950 €	10.115 €	7.225 €	23.120 €	- €	- €	- €	82.290 €	23.120 €	- €	

Possibility to swift from infrastruct. to services

3.5 Forecast detail: Use of the Subcontracted Services' budgets

Technology installed power / Services

	total kW	BIPV crystalline semitrans 69,2% (14)	BIPV thin film semitrans 10,2% (3)	BIPV flexible thin film 10,0% (4)	PV cooling	DS (1kWe/3k Wt) 4,4%	PT-SCH 6,2%	Services Initial Budget (6.15-6.20)	Cost Forecast total € Services	
Total	275,4 kWp	190,6 kWp	28,2 kWp	27,5 kWp	30,0 kWc	12,0 kW	17,1 kWc	514.340 €	516.876 €	0,5%
1_P	15,5 kWp	15,5 kWp							25.575 €	
1_S	5,5 kWp	5,5 kWp							9.075 €	
P1. AEIPLOUS 1	21,0 kWp	21,0 kWp						33.365 €	34.650 €	3,7%
2	44,4 kWp	44,4 kWp			20,0 kWc				73.260 €	
3	5,0 kWp	5,0 kWp							10.750 €	
4	20,0 kWp		20,0 kWp		10,0 kWc				33.000 €	
5	10,0 kWp			10,0 kWp					14.000 €	
P2. EAEE	79,4 kWp	49,4 kWp	20,0 kWp	10,0 kWp	30,0 kWc			161.250 €	131.010 €	-23,1%
6	24,0 kWp	20,0 kWp				4,0 kW			54.290 €	
7	19,0 kWp	19,0 kWp							31.350 €	
8	11,7 kWp			7,7 kWp		4,0 kW			28.800 €	
9	24,0 kWp	24,0 kWp							39.600 €	
10	10,0 kWp	10,0 kWp							16.500 €	
P3. BAU	88,7 kWp	73,0 kWp	0,0 kWp	7,7 kWp		8,0 kW		161.250 €	170.540 €	5,4%
11	5,0 kWp		5,0 kWp						8.250 €	
12	19,6 kWp			2,5 kWp			17,1 kWc		60.426 €	
13	15,0 kWp	15,0 kWp							24.750 €	
P4. AU	39,6 kWp	15,0 kWp	5,0 kWp	2,5 kWp			17,1 kWc	80.625 €	93.426 €	13,7%
14_S1	3,7 kWp	3,7 kWp							6.105 €	
14_S2	6,9 kWp	6,9 kWp							11.385 €	
14_S3	3,2 kWp		3,2 kWp						4.160 €	
P5. MAICh 14	13,8 kWp	10,6 kWp	3,2 kWp			0,0 kW		22.243 €	25.100 €	11,4%
15	9,9 kWp	2,6 kWp		7,3 kWp					14.510 €	
16	13,5 kWp	13,5 kWp							22.275 €	
17	5,5 kWp	5,5 kWp							9.075 €	
18	4,0 kWp					4,0 kW			16.290 €	
p6. EsE-UAB	32,9 kWp	21,6 kWp	0,0 kWp	7,3 kWp		4,0 kW		55.608 €	62.150 €	10,5%

Services Cost Forecast (6.15 - 6.20) — small material

	substructure PV (0,20 tf) 0,45 €	substructure DS (1.000 -2.000 €)	substructure PT-SCH 5.082,00 €	cabling & piping PV (€/Wp 10 kWp reference) 0,10 €	cabling & piping DS (€/4 kW system) 1.900,00 €	cabling & piping PT-SCH (€/17,1 kWc) 14.460,00 €	transportation PV (€/Wp 10 kWp reference) 0,25 €	transportation DS (1000-2.500€ DS)	transportation PT-SCH (2.500 €) 2.500,00 €
Total	109.485 €	6.800 €	5.082 €	23.540 €	5.700 €	14.460 €	61.350 €	6.000 €	2.500 €
1_P	6.975 €			1.550 €			3.875 €		
1_S	2.475 €			550 €			1.375 €		
P1. AEIPLOUS 1	9.450 €			2.100 €			5.250 €		
2	19.980 €			4.440 €			11.100 €		
3	2.250 €			500 €			1.250 €		
4	9.000 €			2.000 €			5.000 €		
5	2.000 €			1.000 €			2.500 €		
P2. EAEE	33.230 €	- €	- €	7.940 €	- €	- €	19.850 €	- €	- €
6	10.800 €	2.000 €		2.000 €	1.900 €		7.500 €	2.500 €	
7	8.550 €			1.900 €			4.750 €		
8	5.265 €	2.000 €			1.900 €			2.500 €	
9	10.800 €			2.400 €			6.000 €		
10	4.500 €			1.000 €			2.500 €		
P3. BAU	39.915 €	4.000 €	- €	7.300 €	3.800 €	- €	20.750 €	5.000 €	- €
11	2.250 €			500 €			1.250 €		
12	500 €		5.082 €	250 €		14.460 €	625 €		2.500 €
13	6.750 €			1.500 €			3.750 €		
P4. AU	9.500 €	- €	5.082 €	2.250 €	- €	14.460 €	5.625 €	- €	2.500 €
14_S1	1.665 €			370 €			925 €		
14_S2	3.105 €			690 €			1.725 €		
14_S3	1.440 €			- €			- €		
P5. MAICh 14	6.210 €	- €		1.060 €	- €		2.650 €	- €	
15	2.630 €			990 €			2.475 €		
16	6.075 €			1.350 €			3.375 €		
17	2.475 €			550 €			1.375 €		
18		2.800 €			1.900 €			1.000 €	
p6. EsE-UAB	11.180 €	2.800 €	- €	2.890 €	1.900 €	- €	7.225 €	1.000 €	- €

Services Cost Forecast (6.15 - 6.20) — Monitoring and engineering

	Monitoring PV - €	Monitoring DS (€/4 kW system) 4.800,00 €	Monitoring PT-SCH (€/17,1 kWc) 9.740,00 €	engineering total	engineering PV (€/Wp 10 kWp reference) 0,25 €	engineering DS (€/4 kW system) 2.640,00 €	engineering PT-SCH (€/17,1 kWc) 5.000,00 €
Total	- €	14.400 €	9.740 €	74.495 €	61.575 €	7.920 €	5.000 €
1_P				3.875 €	3.875 €		
1_S				1.375 €	1.375 €		
P1. AEIPLOUS 1				5.250 €	5.250 €		
2				11.100 €	11.100 €		
3				1.250 €	1.250 €		
4				5.000 €	5.000 €		
5				2.500 €	2.500 €		
P2. EAEE	- €	- €	- €	19.850 €	19.850 €	- €	- €
6		4.800 €		7.640 €	5.000 €	2.640 €	
7				4.750 €	4.750 €		
8		4.800 €		4.565 €	1.925 €	2.640 €	
9				6.000 €	6.000 €		
10				2.500 €	2.500 €		
P3. BAU	- €	9.600 €	- €	25.455 €	20.175 €	5.280 €	- €
11				1.250 €	1.250 €		
12			9.740 €	5.625 €	625 €		5.000 €
13				3.750 €	3.750 €		
P4. AU	- €	- €	9.740 €	10.625 €	5.625 €	- €	5.000 €
14_S1				925 €	925 €		
14_S2				1.725 €	1.725 €		
14_S3				800 €	800 €		
P5. MAICh 14		- €		3.450 €	3.450 €	- €	
15				2.475 €	2.475 €		
16				3.375 €	3.375 €		
17				1.375 €	1.375 €		
18		4.800 €		2.640 €	- €	2.640 €	
p6. EsE-UAB	- €	4.800 €	- €	9.865 €	7.225 €	2.640 €	- €

Services Cost Forecast (6.15 - 6.20) — installation and Total

	installation PV (€/Wp 10 kWp reference) 0,60 €	installation DS (€/4 kW system) 3.150,00 €	installation PT-SCH (€/17,1 kWc) 20.144,00 €	Total PV	Total DS (€/4 kW system)	Total PT-SCH (€/17,1 kWc)
Total	147.780 €	9.450 €	20.144 €	413.845 €	50.270 €	56.926 €
1_P	9.300 €			25.575 €	- €	- €
1_S	3.300 €			9.075 €		- €
P1. AEIPLOUS 1	12.600 €			34.650 €	- €	- €
2	26.640 €			73.260 €	- €	- €
3	3.000 €			8.250 €	- €	- €
4	12.000 €			33.000 €	- €	- €
5	6.000 €			14.000 €	- €	- €
P2. EAEE	47.640 €	- €	- €	128.510 €	- €	- €
6	12.000 €	3.150 €		37.300 €	16.990 €	- €
7	11.400 €			31.350 €	- €	- €
8	4.620 €	3.150 €		11.810 €	16.990 €	- €
9	14.400 €			39.600 €	- €	- €
10	6.000 €			16.500 €	- €	- €
P3. BAU	48.420 €	6.300 €	- €	136.560 €	33.980 €	- €
11	3.000 €			8.250 €	- €	- €
12	1.500 €		20.144 €	3.500 €	- €	56.926 €
13	9.000 €			24.750 €	- €	- €
P4. AU	13.500 €	- €	20.144 €	36.500 €	- €	56.926 €
14_S1	2.220 €			6.105 €		- €
14_S2	4.140 €			11.385 €		- €
14_S3	1.920 €			4.160 €		- €
P5. MAICh 14	8.280 €	- €		21.650 €	- €	- €
15	5.940 €			17.975 €	- €	- €
16	8.100 €			27.000 €	- €	- €
17	3.300 €			11.000 €	- €	- €
18	- €	3.150 €		- €	16.290 €	- €
p6. EsE-UAB	17.340 €	3.150 €	- €	55.975 €	16.290 €	- €

General statement on the European Union

Project funded by the EUROPEAN UNION

The European Union is made up of 27 Member States who have decided to gradually link together their know-how, resources and destinies. Together, during a period of enlargement of 50 years, they have built a zone of stability, democracy and sustainable development whilst maintaining cultural diversity, tolerance and individual freedoms. The European Union is committed to sharing its achievements and its values with countries and peoples beyond its borders.

بيان عام عن الاتحاد الأوروبي

يتكوّن الإتحاد الاوروبي من ال 27 الدول الأعضاء الذين قرروا معاً ربط خبراتهم والموارد ومصائرها. معاً، وخلال فترة 50 عاماً من التوسع، تم بناء منطقة من الإستقرار، الديمقراطية والتنمية المستدامة مع الحفاظ على التنوع الثقافي، التسامح والحريات الفردية. يلتزم الإتحاد الأوروبي في تقاسم إنجازاته وقيمه مع الدول والشعوب خارج حدوده.

General statement on the European Union (Greek)

Η Ευρωπαϊκή Ένωση αποτελείται από 27 Κράτη Μέλη που έχουν αποφασίσει να συνδέσουν σταδιακά την τεχνογνωσία, τους πόρους και το μέλλον τους. Κατά τη διάρκεια μιας περιόδου διεύρυνσης 50 ετών, έχουν δημιουργήσει μαζί μια ζώνη σταθερότητας, δημοκρατίας και αειφόρου ανάπτυξης διατηρώντας παράλληλα την πολιτιστική πολυμορφία, τη διαφορετικότητα και τις ατομικές τους ελευθερίες. Η Ευρωπαϊκή Ένωση έχει δεσμευθεί να μοιράζεται τα επιτεύγματα και τις αξίες της με χώρες και λαούς που βρίσκονται εκτός των συνόρων της.

Statement about the Programme

ENPI CBCMED
CROSS-BORDER COOPERATION IN THE MEDITERRANEAN

The 2007-2013 ENPI CBC Mediterranean Sea Basin Programme is a multilateral Cross-Border Cooperation initiative funded by the European Neighbourhood and Partnership Instrument (ENPI). The Programme objective is to promote the sustainable and harmonious cooperation process at the Mediterranean Basin level by dealing with the common challenges and enhancing its endogenous potential. It finances cooperation projects as a contribution to the economic, social, environmental and cultural development of the Mediterranean region. The following 14 countries participate in the Programme: Cyprus, Egypt, France, Greece, Israel, Italy, Jordan, Lebanon, Malta, Palestinian Authority, Portugal, Spain, Syria, Tunisia. The Joint Managing Authority (JMA) is the Autonomous Region of Sardinia (Italy). Official Programme languages are Arabic, English and French.

بيان حول البرنامج

إن برنامج NPI CBC MedE 2007 – 2013 الأوروبية هو برنامج للتعاون المشترك عبر الحدود لحوض البحر الأبيض المتوسط، هو جزء من سياسة الجوار والشراكة ومن آلياتها التمويلية. يهدف هذا البرنامج إلى تعزيز ودعم عملية التعاون المستدام والمنسجم على مستوى حوض البحر الأبيض المتوسط وذلك من خلال معالجة التحديات المشتركة وتعزيز الإمكانات الذاتية. يموّل البرنامج مشاريع التعاون كمساهمة في التنمية الإقتصادية، الإجتماعية، البيئية والثقافية لمنطقة البحر الأبيض المتوسط. إن الدول المشتركة في البرنامج: قبرص، مصر، فرنسا، اليونان، إسرائيل، الأردن، لبنان، مالطا، السلطة الفلسطينية، البرتغال، إسبانيا، سوريّا، ال 14 التالية هي الدول المشاركة في البرنامج: تونس. إن سلطة الإدارة المشتركة JMA هي منطقة الحكم الذاتي لمقاطعة سردينيا (إيطاليا). إن اللغات الرسمية للبرنامج هي : العربية ، الإنجليزية والفرنسية.

Statement about the Programme

Το Πρόγραμμα Διασυνοριακής Συνεργασίας Μεσογειακής Λεκάνης (ENPI CBC Mediterranean Sea Basin) 2007-2013 είναι μια πολυμερής πρωτοβουλία Διασυνοριακής Συνεργασίας η οποία χρηματοδοτείται από το Ευρωπαϊκό Μέσο Γειτονίας και Εταιρικής Σχέσης (ENPI). Το Πρόγραμμα έχει σαν στόχο να συμβάλει στην προώθηση της βιώσιμης και αρμονικής συνεργασίας στην περιοχή της Μεσογειακής Λεκάνης αξιοποιώντας πλήρως τις ενδογενείς δυνατότητες της περιοχής και αντιμετωπίζοντας τις κοινές προκλήσεις. Χρηματοδοτεί έργα συνεργασίας τα οποία συμβάλλουν στην οικονομική, κοινωνική, περιβαλλοντική και πολιτιστική ανάπτυξης της Μεσογείου. Στο Πρόγραμμα συμμετέχουν οι ακόλουθες 14 χώρες: Κύπρος, Αίγυπτος, Γαλλία, Ελλάδα, Ισραήλ, Ιταλία, Ιορδανία, Λίβανος, Μάλτα, Παλαιστινιακή Αρχή, Πορτογαλία, Ισπανία, Συρία, Τυνησία. Η Κοινή Διαχειριστική Αρχή (ΚΔΑ) του Προγράμματος, είναι η Αυτόνομη Περιφέρεια της Σαρδηνίας (Ιταλία). Επίσημες γλώσσες του Προγράμματος είναι τα Αραβικά, Αγγλικά και Γαλλικά.

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تنبيه

. إن محتويات هذه الوثيقة "ENPI CBC Med لقد تم إعداد هذه النشرة بمساعدة مالية من الإتحاد الأوروبي في إطار برنامج التعاون المشترك عبر الحدود لحوض البحر الأبيض المتوسط من مسؤولية ---------- ولا تعكس تحت أي ظرف من الظروف رأي الإتحاد الأوروبي أو الهياكل الداخلية للبرنامج. "

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European Union web links
http://ec.europa.eu/world/.
Europe Aid Development and Cooperation Office http://ec.europa.eu/europeaid/index_en.htm
ENPI CBC Med Programme http://www.enpicbcmed.eu

The project DIDSOLIT-PB is implemented under the ENPI CBC Mediterranean Sea Basin Programme (www.enpicbcmed.eu). Its total budget is 4,3 million Euro, and it is financed, for an amount of 4,1 million Euro, by the European Union through the European Neighbourhood and Partnership Instrument. The ENPI CBC Med Programme aims at reinforcing cooperation between the European Union and partner countries regions placed along the shores of the Mediterranean Sea."

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