EE-RE projects with Med North-South involvement

MARIE 6th Steering Committee_Malta

27th March 2014

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Project funded by the EUROPEAN UNION

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EAEE
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BAU
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AU
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MAICh
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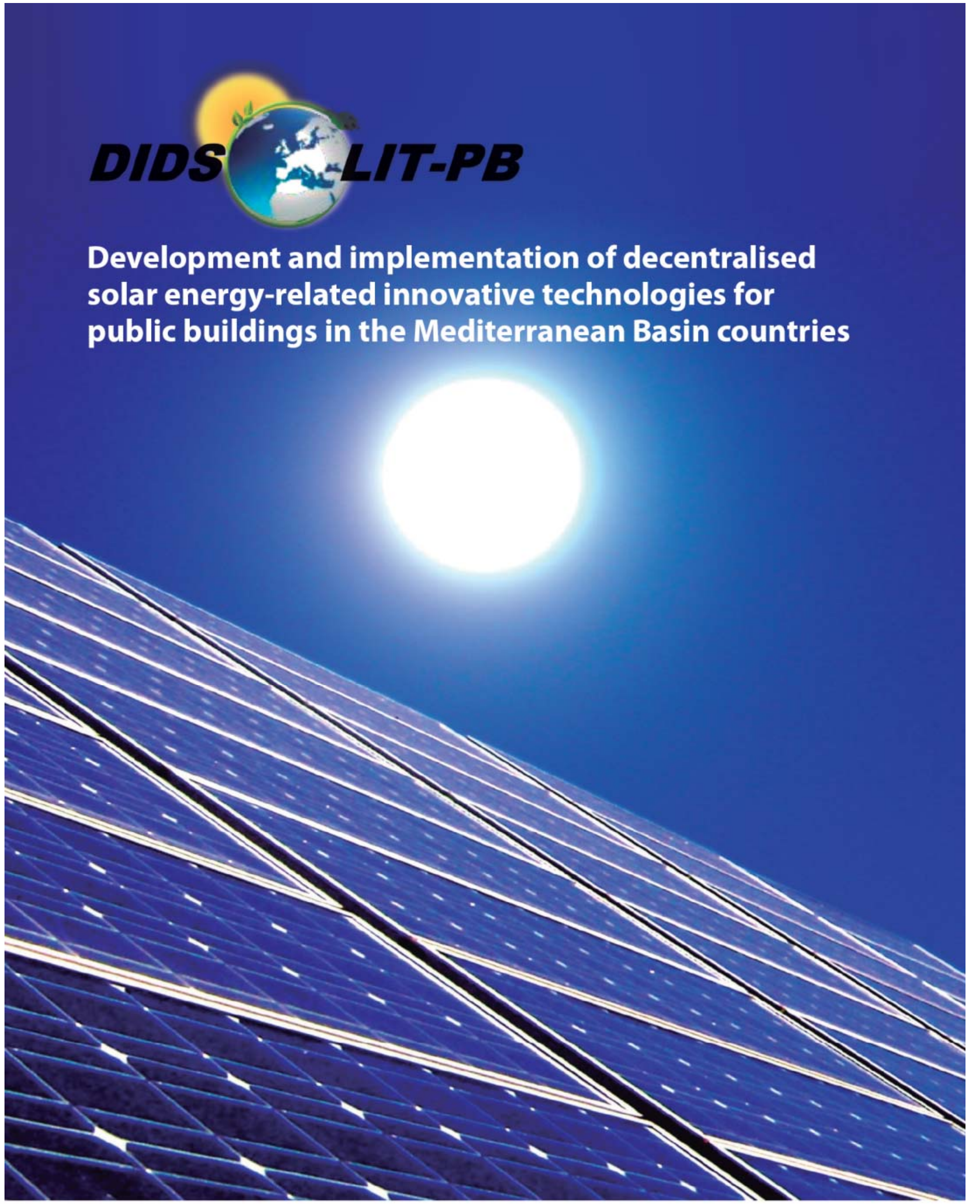

Development and implementation of decentralised solar energy-related innovative technologies for public buildings in the Mediterranean Basin countries

EU Programme: Mediterranean Sea Basin programme 2007-2013, implemented through ENPI-CBCMED's Call for Strategic Projects 2011.

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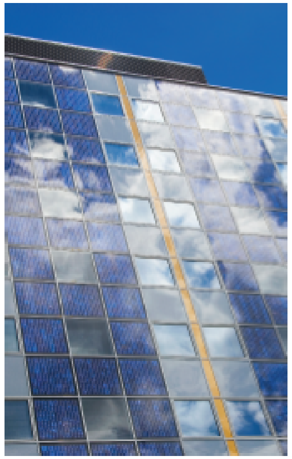
ENPI CBCMED
CROSS-BORDER COOPERATION IN THE MEDITERRANEAN

The ENPI CBC Med Programmeaims at reinforcing cooperation between the European Union and partner countries regions placed along the shores of the Mediterranean Sea. (http://www.enpicbcmed.eu)



Project objectives

- To promote and implement **innovative technologies** and know-how transfer for **decentralised, small scale, solar power systems**, integrated in public buildings. (264 kWp in 10-12 buildings)
- **Cross-border public-private partnership** and cooperation from Med regions (Spain, Greece, Egypt and Jordan)
- Focused on **solar technologies available in the market**, that may require to be scaled-down and adapted.
- To improve knowledge on the **potential and compative cost-benefit** of these solar technologies.
- Implementation of **public policies** to promote **solar-energy deployment**

Target groups

- Owners and users of public buildings
- SMEs specialised in solar energy
- Authorities in charge of RE policies

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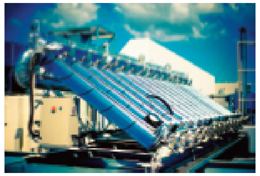
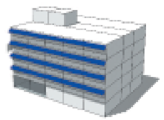
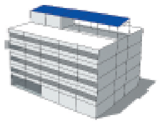


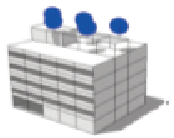
Solar technologies

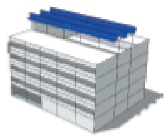
- Solar systems chart of options
- Small scale applications (from 10 to 20 kWp)

- BIPV systems
- Small scale CSP:
  Parabolic trough and Dish Stirling
- CSP + Solar Cooling/Heating









Global approach

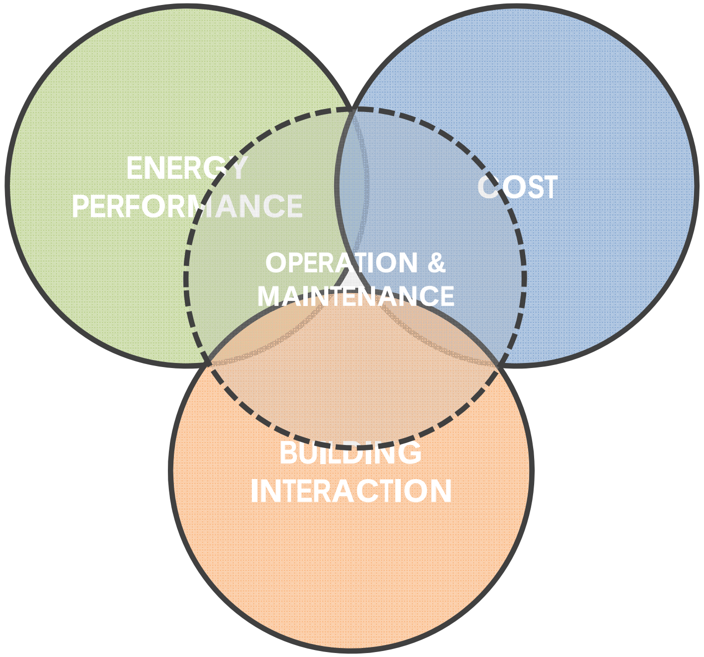
Electricity cost :
Grid parity scenario
Return of investment

Power installed:
264 kWp

Energy produced:
380 MWh/year

Scale down Dish-Stirling, Parabolic Trough and PT Solar Cooling application

Maintaining an optimal performance ratio



Average investment
5.500 €/kW

Chart of options :
5 technologies >
Range of options
3,5 – 9 €/W

Low maintenance scenario

Minimum, **10 buildings**

Building envelope requirements
Aprox. 100-250 m2 / SUA

Structural and construction requirements

LEGISLATION & ADMINISTRATIVE PROCESS
The projects will follow the national current procedures.
Nevertheless, the Project will propose improvements to decision makers.

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Main threats and challenges for solar RE in MENA countries (DIDSOLIT-PB context: Egypt and Jordan)

Solar technologies: energy performance

- In some countries, the lack of local providers for material and components makes the installation and O&M of the RE systems difficult.
- Lack of experience in RE installation and Operation & Maintenance.
- Local climate characteristics, despite excellent levels of solar radiation, involve some O&M issues (sand, dust…etc) regards cleaning.

Solar technologies: cost and local availability

- When local alternatives are not available, import procedures and taxes might be challenging.
- O&M costs have to be taken into consideration.
- The LCOE of small scale innovative decentralized solar applications might be significantly higher than the one for standard RE solutions (standard PV modules, big scale CSP or SCH plants).

> DIDSOLIT-PB project should be seen as a technology trigger for future local developments!!

Building integration

- Select buildings in good construction conditions, counting on existing O&M.
- Select buildings with a good level of passive energy performance.

> DIDSOLIT-PB recognizes that RE integration should be the last stage of an Energy efficiency strategy!!! (complementary to MARIE project)

- Key is energy monitoring and control. Data collection.

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Main threats and challenges for solar RE in MENA countries (DIDSOLIT-PB context: Egypt and Jordan)

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Economical (electricity cost)

- Electricity cost varies depending on country and building type.
- Subsidized electricity.

  Some governments, like Egypt, pay the difference between energy production and users cost.
- Cost-efficiency analysis should be based on real production costs (not always available). Last years energy inflation scenarios might be considered

  eg: approx. energy cost inflation: Jordan approx. 60% from 2010, Egypt 7% annual over the last 10 years.
- Jordan (NAMA)

  eg: electricity cost ordinary consumers 7th block (> 1000 kWh/month) 0,22 €/kWh. Solar FIT: 0,12 €/kWh
- Egypt (NREA)

  eg: electricity cost: 0,03 – 0,07 €/kWh. No FIT.

Policies and administrative aspects

- According to IRENA 2013 report 18 of the 21 MENA countries have some type of policy to promote RE power generation (especially NOIC (oil importers) countries)
- In practice, implementation faces challenges, calling for case by case solutions.
- Absence of FIT policy in most of the countries (except Jordan and others)
- Lack of regulation for RE grid connection> OFF-grid as the only option in some countries.

  eg: Jordan: possibility of grid connection and Net Balance

  eg: Egypt: Theoretically, Net Balance is available. In practice, however, grid connection is not regulated and has to be analyzed case by case.

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Renewable Energies policies in MENA countries
(DIDSOLIT-PB context: Egypt and Jordan)

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Table 5. Renewable Energy Support Policies and Targets in the MENA Countries

National Level / State Level

				Regulatory Policies						Fiscal Incentives				Public Financing	
		Renewable Energy Targets	Renewable Energy Strategy or Plan	FIT (incl. premium payment)	Electric utility quota obligation/RPS	Net metering	Biofuels obligation/mandate	Heat obligation/mandate	Tradable REC	Capital subsidy, grant, or rebate	Investment/production tax credits	Reduction in sales, energy, CO_2, VAT, or other taxes	Energy production payment	Public investment, loans, or grants (incl. R&D)	Public competitive bidding
NOEC	Algeria	✔	✔												
	Bahrain	✔													
	Egypt	✔	✔	D		?								?	
	Iran	✔	✔												
	Iraq	✔	✔												
	Kuwait	✔													
	Libya	✔													
	Oman	✔													
	Qatar	✔													
	Saudi Arabia	✔		D											
	Syria	✔													
	UAE	✔	✔	D											
	Yemen	✔	✔												
	Total NOEC	13	6	3 3D	2	2	0	1	0	3	2	2	3	8	8
NOIC	Djibouti	✔	✔												
	Israel	✔	✔												
	Jordan	✔	✔												
	Lebanon	✔	✔												
	Malta	✔	✔												
	Morocco	✔	✔												
	Palestinian Territories	✔	✔												
	Tunisia	✔	✔												
	Total NOEC	8	8	4	0	5	1	1	0	2	0	5	1	4	4
TOTAL MENA		21	14	7 3D	2	7	1	2	0	5	2	7	4	12	12

Note: "D" stands for "under discussion."
Sources: See Endnote 1 for this section.

(?) Not implemented yet. To be analyzed case by case

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Renewable Energies policies in MENA countries
(DIDSOLIT-PB context: Egypt and Jordan)

Table 6. Overall Renewable Energy Share Targets in the MENA Countries

		Renewable Energy Targets and Target Dates
NOEC	Algeria	6% of electricity generation by 2015; 15% by 2020; 40% by 2030, of which 37% is solar (PV and CSP) and 3% is wind
	Bahrain	5% by 2020
	Egypt	20% of electricity generation by 2020, of which 12% is wind
	Iran	—
	Iraq	2% of electricity generation by 2016
	Kuwait	5% of electricity generation by 2020; 10% by 2030
	Libya	3% of electricity generation by 2015; 7% by 2020; 10% by 2025
	Oman	10% by 2020
	Qatar	At least 2% of electricity generation from solar by 2020
	Saudi Arabia	—
	Syria	—
	UAE	Dubai: 5% of electricity by 2030; Abu Dhabi: 7% of electricity generation capacity by 2020
	Yemen	15% of electricity by 2025
NOIC	Djibouti	30% of rural electrification from solar PV by 2017 100% renewable energy by 2020
	Israel	5% of electricity generation from renewables by 2014; 10% by 2020
	Jordan	7% of primary energy by 2015; 10% by 2020
	Lebanon	12% of electrical and thermal energy by 2020
	Malta	10% of final energy from renewables by 2020; 14% of electricity by 2020; 6% of heating and cooling by 2020; 11% of transport by 2020
	Morocco	42% of installed power capacity by 2020
	Palestinian Territories	25% of energy from renewables by 2020; 10% (or at least 240 GWh) of electricity generation by 2020
	Tunisia	11% of electricity generation by 2016; 25% by 2030; 16% of installed power capacity by 2016; 40% by 2030.

Source: See Endnote 3 for this section.

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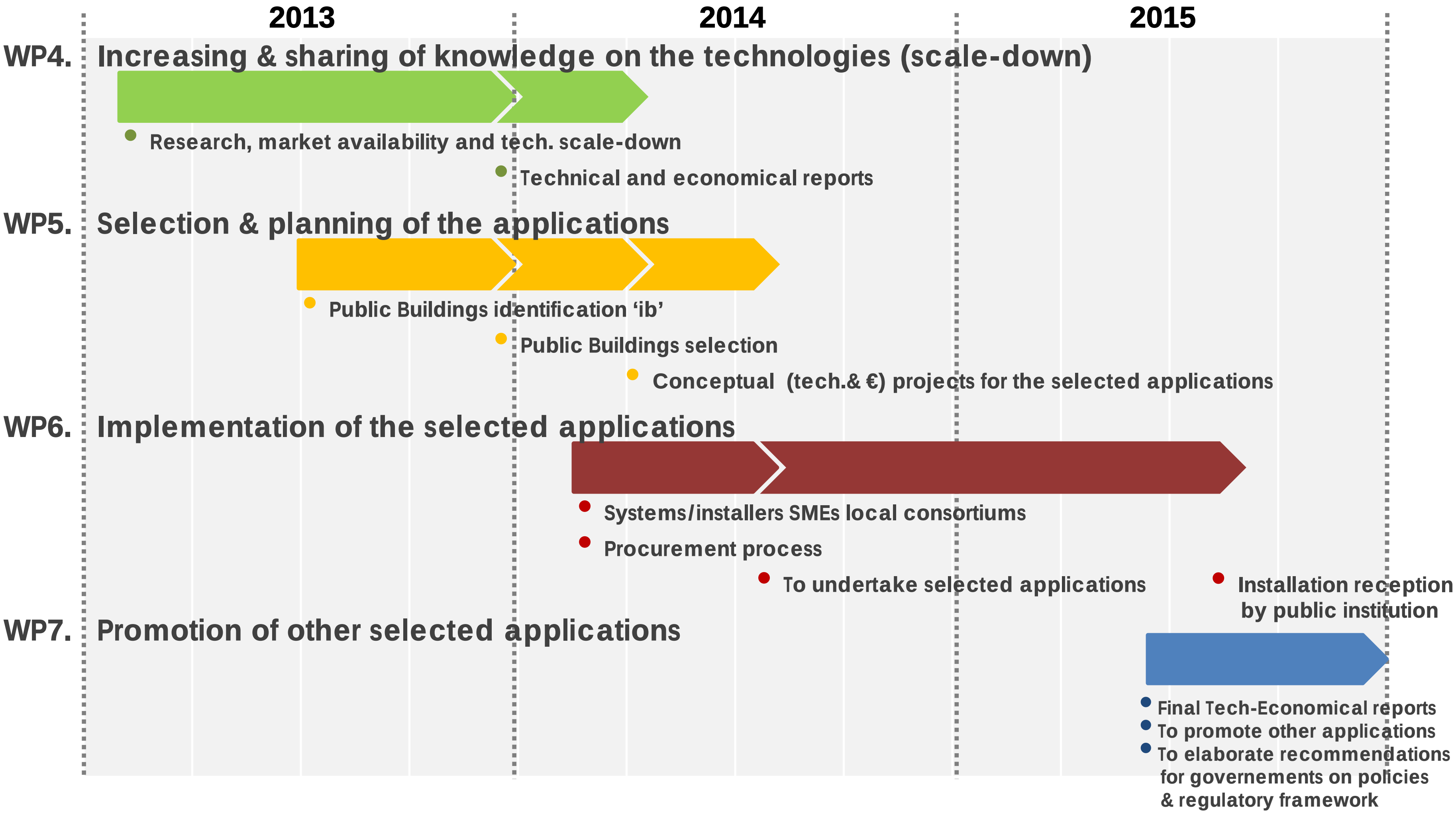
Project timeline



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WP4. Technology analysis and selection

of small-scale, market available solar technologies.
Technical / economical viability

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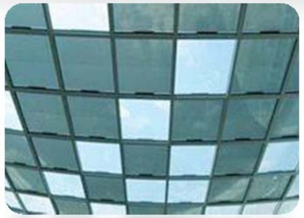
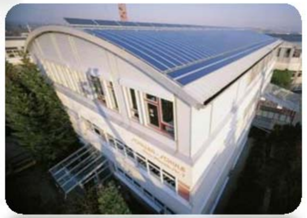
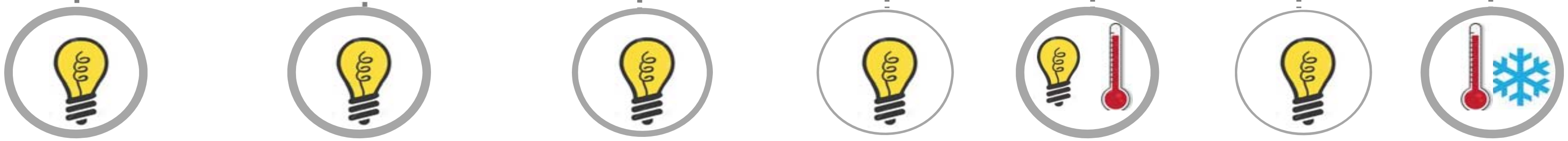
BIPV





Dish Stirling

Parabolic Trough PT-Solar Cooling



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WP5. Building selection.

Choosing the most feasible application

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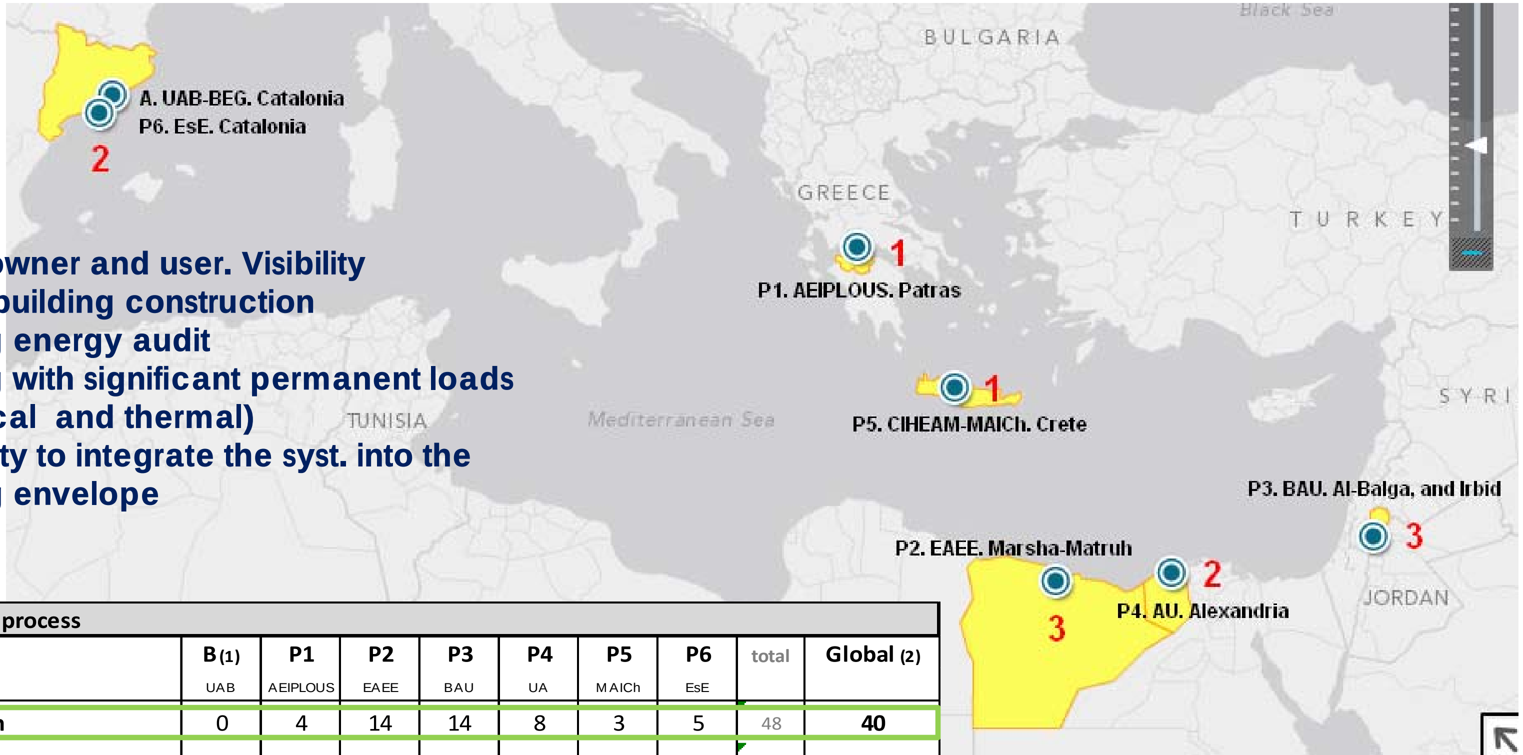
Final Building selection ‘b’ of local public **buildings/facilities**, **10-12 total** (minimum)



- Public owner and user. Visibility
- Proper building construction
- Building energy audit
- Building with significant permanent loads (electrical and thermal)
- Possibility to integrate the syst. into the building envelope

Building selection process									
	B (1) UAB	P1 AEIPLOUS	P2 EAEE	P3 BAU	P4 UA	P5 MAICh	P6 EsE	total	Global (2)
ib indentification	0	4	14	14	8	3	5	48	40
pb pre-selected	0	3	9	9	5	2	4	32	30
b selected buildings	0	1	3	3	2	1	2	12	10

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WP6. Implementation of the selected applications

Compromise between different technologies,
available buildings and budgets

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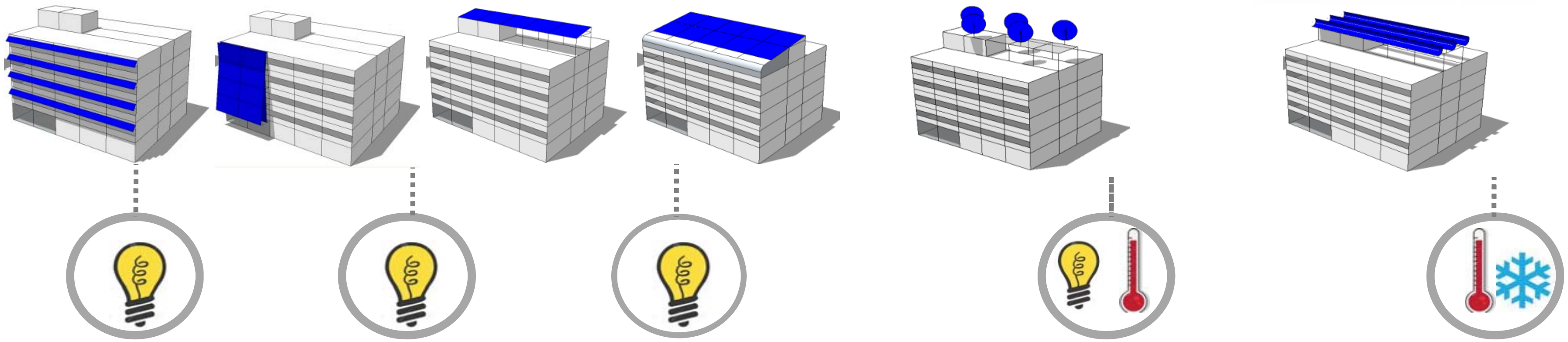

BIPV
approx. 65-70% installed power
about 178 kWp

Dish Stirling
5-10% installed power
about 15 kW

Parabolic Trough
PT-Solar Cooling
25-30% installed power
about 71 kW

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WP6. Implementation of the selected applications

Pre-selected building and application examples: Alexandria

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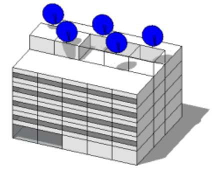

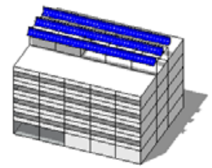

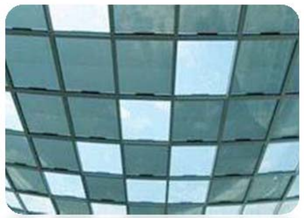

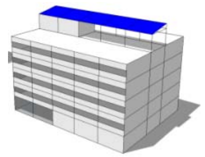

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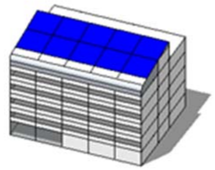

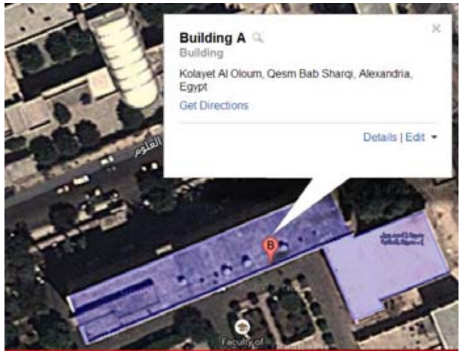

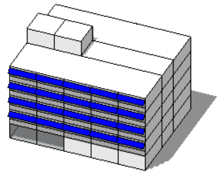

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Thanks for your attention!!

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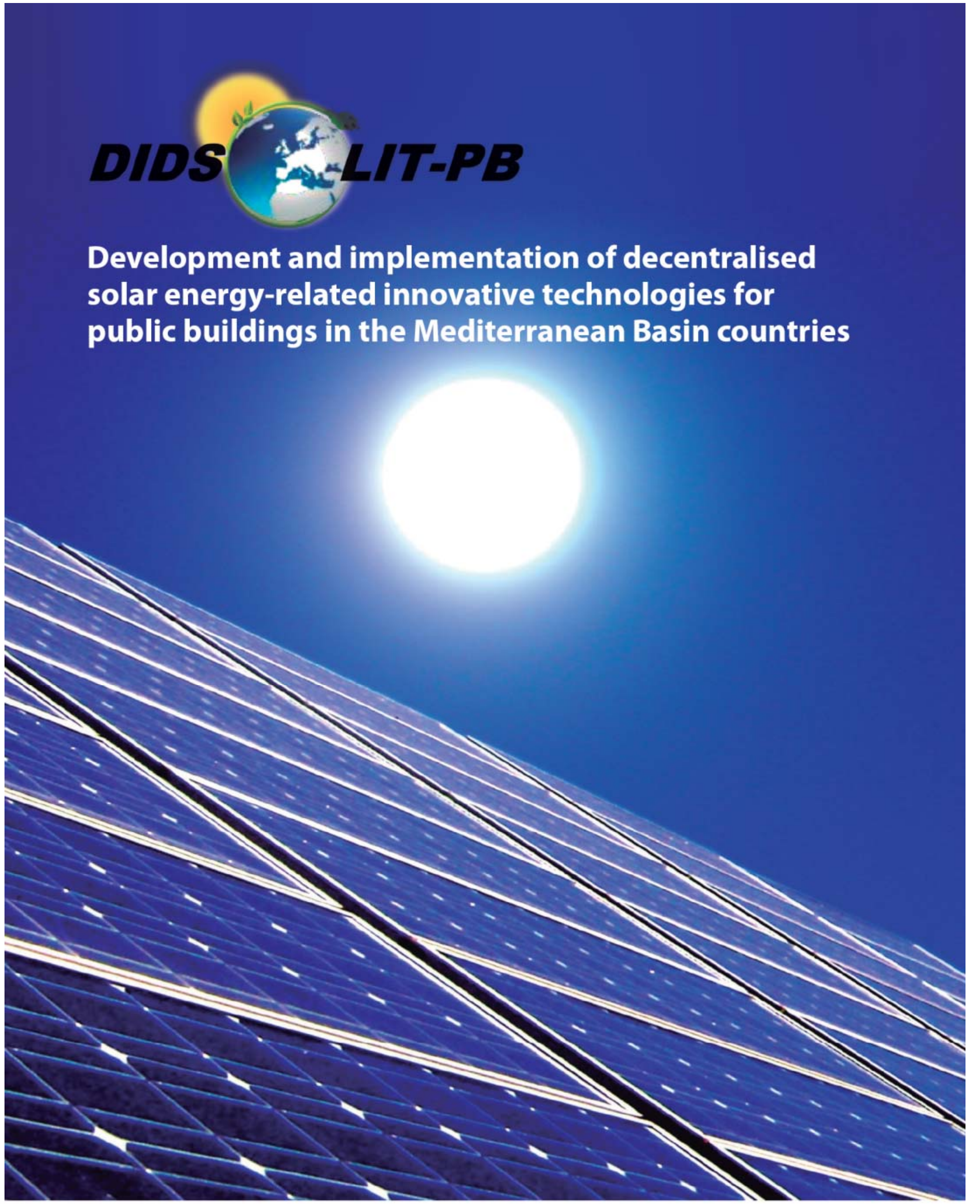

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