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Intelligent Energy Europe

Solar Energy Use in Outdoor Swimming Pools
SOLPOOL

Fact Sheets Greece

CRES

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1 National Fact sheet Greece

The national fact sheets will provide an overview about the situation of the usage of solar thermal heating for outdoor pools. This information will be used to show the state of the art, regarding the special regional conditions and to develop a common approach for the supporting solar thermal systems in this special application. The information was requested by every participating country in the project. The present fact sheet regards Greece.

1.1 State of the art of conventional heating systems for outdoor pools

The present common heating systems for outdoor swimming pools and the used fuels are listed.

Used techniques:

- Boiler with heat exchanger
- Heat pumps
- Unglazed solar thermal collectors

Used fuels

- Oil
- Gas

1.2 State of the art of solar thermal applications for outdoor pool heating

A list of present available and used solar thermal technologies, especially for pool heating, is provided. This will provide the state of the distribution and the acceptance of solar thermal systems.

Collectortype:

- Flat plate collector with heat exchanger
- Unglazed solar thermal collectors

System details:

- Unglazed collectors are mainly used for small pools
- Flat plate collectors are used with heat exchanger for higher heating levels

1.3 Best available technology and best practice for solar thermal outdoor pool heating

The best technical approaches, regarding the national and regional conditions, are listed here. Every participating country will give the best practice for the installation of solar thermal pool heating systems according to the special national conditions. This information will be used in the national campaigns.

Best available technology:

- Unglazed collectors for direct water heating for small scale or/and low energy demand installations

- Flat plate collectors with heat exchanger for large scale or/and high energy demand installations

Best practice:

- Unglazed collectors for direct water heating for small scale or/and low energy demand installations
- Flat plate collectors with heat exchanger for large scale or/and high energy demand installations

1.4 Boundary conditions

The list should show the national and regional barriers, which must be overcome to improve the awareness of the end users and the implementation of solar thermal heating systems. This includes technical or climate barriers but also as governmental, financial and societal boundary conditions.

Technical or climatic barriers:

- Large area - close to heated pool, required for unglazed collectors.

Financial Barriers:

- Cost of flat plate collectors is higher than a heat pump
- No funding schemes for private users
- Lack of awareness for funding schemes for professionals (hotels e.t.c) when available

Governmental barriers:

- The heigh of collectors when installed should not exceed a specific maximum height according to the building's licence.

Social barriers:

- Lack of knowledge and awareness about solar thermal systems and funding schemes
- Low interest of installers to promote solar thermal systems
- Visual impact
- Architects negative approach to solar thermal collectors implementation

1.5 Existing norms and standards

The existing standards and norms for the installation and use of solar thermal heating devices are stated here. Additional outdoor swimming pool norms and standards concerning solar thermal heating systems are listed. All important standards, which impacts the installation and usage of a solar thermal system are named and will be concerned by the development of the campaign strategies.

Solar Thermal pool heating:

- ISO/TR 12596:1995

Solar thermals applications:

- Solar Key mark
- EN 12975-1:2006

- EN 12975-2:2006
- EN 12976-1:2006
- EN 12976-2:2006
- EN ISO 9488:1999
- ENV 12977-1:2001
- ENV 12977-2:2001
- ENV 12977-3:2001

Outdoor pool operation concerning solar thermal heating:

- Description of constructive issues, Ministerial Decree C1/443/1973
- Official gazette 120B/2006

1.6 Cost benefit analysis and impact

An important fact for the end user is a cost benefit analysis. Here the common costs for solar thermal systems, including system and installation costs per m², are stated. An estimation of the size of the national market is done. And the gain of heating power per m² collector surface and the resulting savings of CO_2 are described.

Market size:

- Market depends on the type of the pool:
  - Athletic pools have high energy demand due to yearly operation.
  - High class hotels offer heated pools in yearly basis.
  - Private pools usually are not heated.
- Number of pools 150,000 – roughly 10% of them are heated

System costs per collector m², total cost including installation:

- Flat plate collector: 300€/m²
- Unglazed collector: 100€/m²

Heat gain in kWh per m² collector according to solar radiation and opening duration of the pool:

- Average opening time per year: about 300 days
- Average solar radiation (horizontal): 1000W/m²

Energy and CO_2 savings per m² collector and per year:

Description	Energy savings(kWh/m^2/year)
Central systems – Flat-plate collectors (black paint)	600
Central systems –Flat-plate collectors (selective surface)	700
Central systems – Unglazed collectors	300

Heating system	**CO_2 Emission in g/kWh**	**Saved CO_2 in kg/m² per year**
Electric	953	285.9
Oil	375	112.5
Natural gas	356	106.8
Heat pump Air	187	56.1
Heat pump Soil	167	50.1
Heat pump Water	146	43.8
Solar Thermal (flat plate)	30	9
Data: Umweltbundesamt Germany All calculations are for unglazed collectors		

2 Requirement Sheet Greece

In this sheet the requirements of a solar thermal system, regarding the needs of the end users

Requirements of the End Users	Very Important	Less Important
Energy savings for heating system		X
Saving of energy costs	X	
Cost benefit from installing solar thermal system	X	
Long time durability of the system	X	
Low effort for installation		X
Low effort and costs for maintenance		X
Low required space for collectors	X	
Integration in existent heating systems		X
No problems with the pool hygiene		X
Plant safety, no risk for pool users		X
Easy handling of the system		X
Availability of grants /subsidies	X	
Independency from increasing energy costs	X	
Environmental protection		X
Visual impact	X	
High initial investment	X	

3 Funding Sheet Greece

The table shows the information of national and regional available grant programmes. They mainly should list the programmes for solar thermal use for outdoor swimming pool heating, but also schemes, which will support the use of solar thermal systems

Funding sheet Greece		
Contact information	**Title**	Ministry of Development
	First name	
	Last name	
	Position	
	Email	
	Telephone	
Financing Information	**Organisation**	National Development Law 3299/0
	Type of Support	Investment and tax deduction
	Available Money	not yet known
	Share of total budget	Up to 60% investment costs and 100% taxes - depending on the region
	Who can apply	terrestrial sector
	Requirements for application	not yet known
	Targeted areas	hotels, industries, enterprises, professionals
	Short description	Renewable energy sources, energy saving, modernization of enterprise
	Documents	not yet known
	Source of information	ministry of development
	Year of beginning	expected end of 2007
	Information website	www.ypan.gr, www.3kps.gr