



CRES - Centre for Renewable Energy Sources
Department of Photovoltaic Systems

Current Situation and Potential for PV Market Development in Greece

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Earlier PV Applications in Greece

The main PV installations of **PPC (Public Power Corporation)** developed in the '80s are listed below:

Site	Installed PV Power, [kWp]	Year of Commissioning	Remarks
Agia Roumeli	50.0	1982	Stand-alone community, R&D (was dismantled in 1991)
Kythnos	100.0	1983	Local island grid, hybrid system, R&D
Antikythira	27.6	1987	Stand-alone, island, demo
Gavdos	20.8	1987	Stand-alone, island, demo
Arki	27.5	1988	Stand-alone, island, demo
Aegean Sea Islands	61.6	1988–1990	80 stand-alone small systems
	287.5	total	



Early PPC PV Systems

100kWp PV System at Kythnos island



27.5kWp PV System at Arki island



Aims of this relatively early development of PV systems by PPC were mainly R&D and Demonstration to **gain experience** on the operation of solar power supply systems for the electrification of remote areas using local energy resources. These applications had a strong **social content** and assisted in the development of the local communities in terms of job creation, tourism business etc.



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Other important PV installations have been developed by,

- **Hellenic Tel. Org.:** ~100kWp for stand-alone telecommunication systems
- **Hellenic Navy:** ~70kWp for some 900 lighthouses in the Aegean and Ionian Sea





Recent PV Applications in Greece – European Projects

Installation of a modular 60kWp PV system on the
island of Sifnos



THERMIE-A Project
Participants: CRES, PPC,
ANIT, SMA
Installed: March 2000



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PV Enlargement – Installation of 40kWp PV at CRES Premises

5FP Project

Participants: WIP, CRES +
another 24 organisations

Installed: November 2003





Recent PV Applications in Greece – National Projects

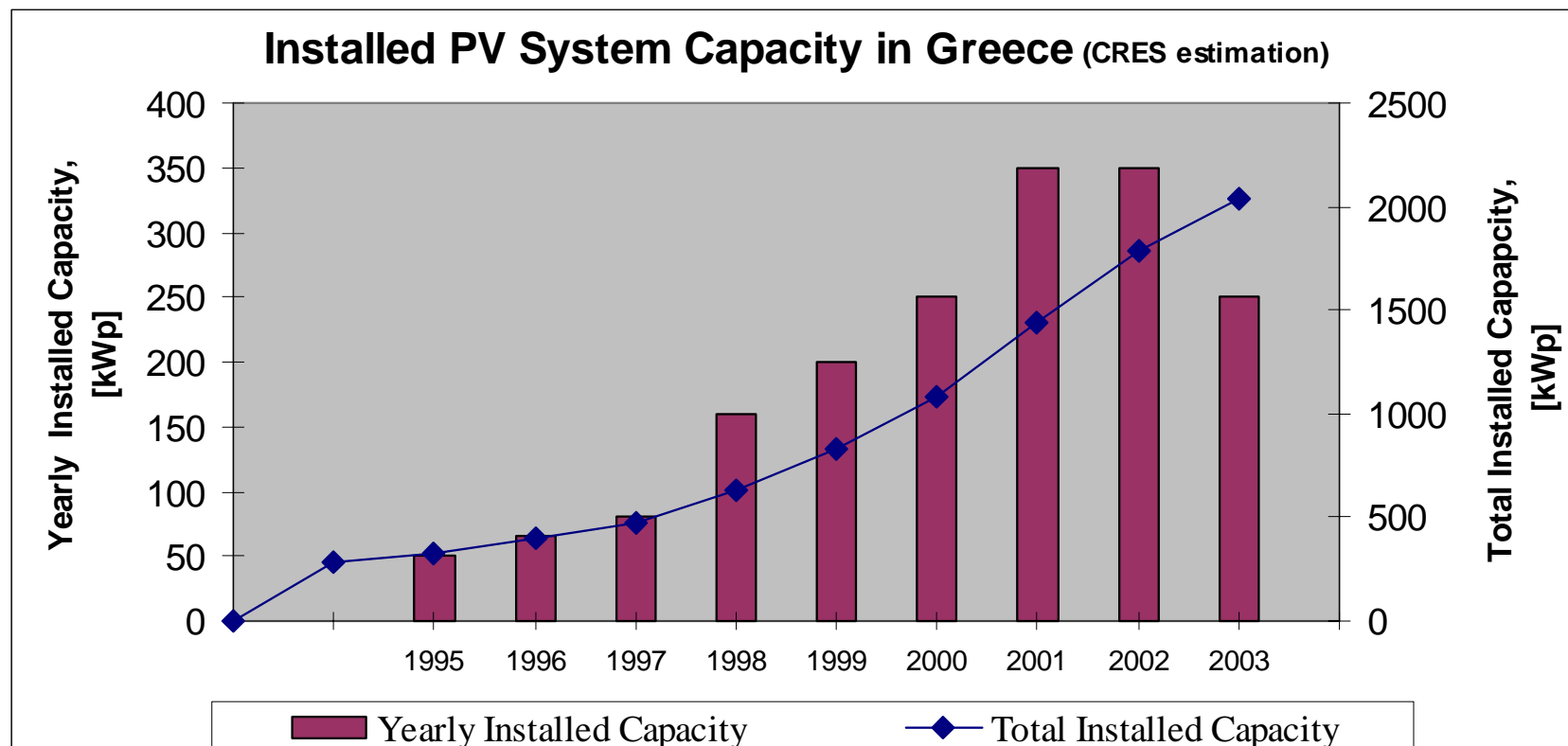
A number of projects have been co-financed through:

- **OEP – Operational Energy Programme (1997–2000)**
PV subsidy: (50–55)% depending on the system size.
- **OPC – Operational Programme for Competitiveness (2001–to date).** PV subsidy: (40–50)% depending on the location of the application.
- **Development Law**

A total of **700kWp PV capacity** was installed during the last 6 years, with the majority of the applications on the island of Crete, where a subsidy of 70% was granted to the investors.

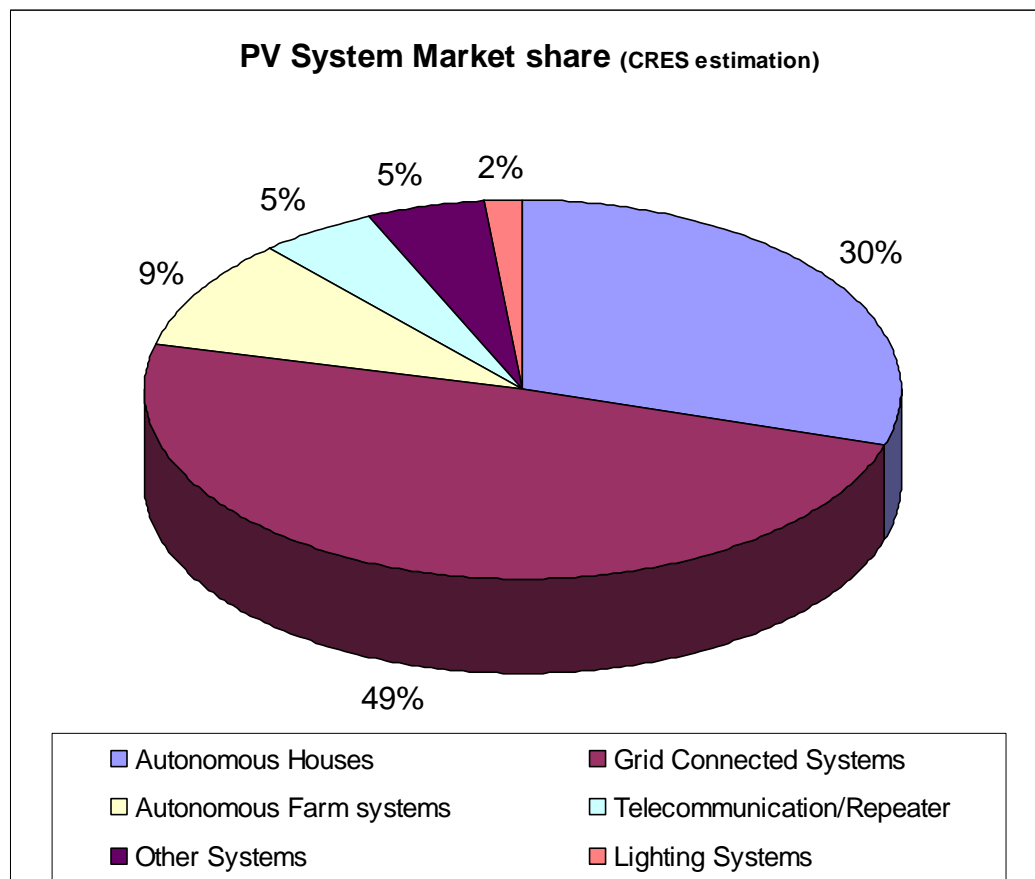


Installed PV Power in Greece





PV Market Share in Greece



PV Energy Production

➤ 2002: 2.3GWh

➤ 2003: 2.7GWh

PV Industry Turnover 2003

~€3.0M

PV Industry Workforce

60–70 persons

Annual National R&D Budget

~€2.2M for PV technologies



Legislation and Measures

- L. 2244/94:** Law for RES; PPC is obliged to buy the electricity produced by RE sources at a fixed price
- L. 2364/95:** Tax exemption incentive; 75% of the investment to be deducted from the taxable income. **This important for PVs incentive was discontinued in 2001.**
- L. 2601/98:** Development Law; provided incentives for industrial activities in the sector of New Technologies. This Law is under revision.
- L. 2773/99:** Liberalisation of the energy market, establishment of RAE – Regulatory Authority for Energy
- L. 2773/99:** Special Tariff for RES; since April 2003, PPC charges its customers €60c per MWh, which is rendered to the TSO. **The annual amount is estimated €20M.**



Industrial Activities in the PV Sector in Greece

PV Module Manufacturers

- **Heliodomi:** manufacturing plant for the production of a-Si modules is under way
- **Energy Solutions:** development for the production of crystalline modules was initiated in January 2004

Power Electronics

2–3 manufacturers of inverters and chargers for stand-alone systems and inverters for grid-connected PV applications

Batteries

2–3 manufacturers of batteries designed for solar PV systems



Professional Activities in the PV Sector in Greece

System Designers and Installers

Approximately 30 companies are involved in the marketing of PV modules and sub-components and the design and installation of PV systems in Greece.

PV Research and Technological Development

Several research activities on material science, components and system level integration are carried out by Research Centres, Universities and Technological Institutions.



Perspectives for PV Market and Industrial Development in Greece

- The potential for PV applications is huge. **Public awareness** on solar energy is positive and the success of the solar thermal initiative could be repeated, should a consistent PV roof-top Programme is effective.
- PV integration in the energy production of **island grids** is several $\times 10\text{MWp}$. PV electricity is **cost-competitive** on small and medium size islands.
- PV industry is already developing in Greece. Favourable **market conditions** and an **appropriate framework** environment will be the driving force for the industry.



Suggestions for Development of PV Technology and Applications in Greece

1. A **National Programme** for Photovoltaic applications in Greece should be developed. The Programme would establish a **framework** and a **feed-in tariff policy**, well adapted to the certain conditions in the country.
2. This activity will create further **industrial development and competitiveness** in the PV sector and it is essential that this activity is supported by the government.
3. PV technology is compatible to the **Distributed Generation concept**, in line with a new development of the energy production / transmission / distribution chain by major utilities in Europe.



Suggestions for Development of PV Technology and Applications in Greece (continued)

4. PV applications on the **islands** is a first priority matter. **PPC** is responsible for the power generation and distribution on islands and should reconsider its policy in regions where local generation by conventional means is costly. The successful programme of the '80s could be repeated.
5. Technical **requirements** and **licenses** for grid-connected PV systems must be reconsidered, aiming in simplifying the procedures.
6. Professional **dissemination** and **educational** actions are needed.



Conclusions

- The positive public awareness and the conditions in Greece favour the development of PV technology and applications. A **PV National Programme** must be elaborated to support this action.
- Experience gained from early innovative applications shows that electricity production from PVs is **cost effective** in the islands. Large scale PV applications will support the development of **ecological tourism**.
- Apart from the environmental benefits, PV development has a considerable **added value** to affiliated economical activities, creation of SMEs, industrial development etc.