Renewable Energy – Innovation and Entrepreneurship

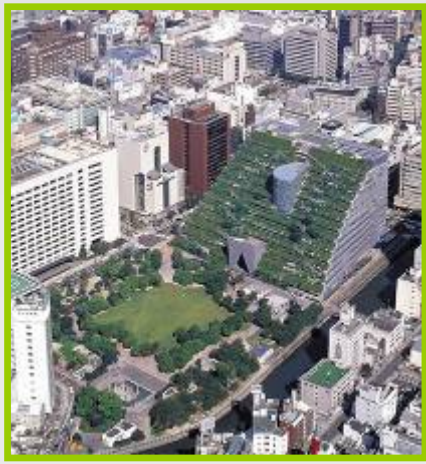
I. Agapitidis

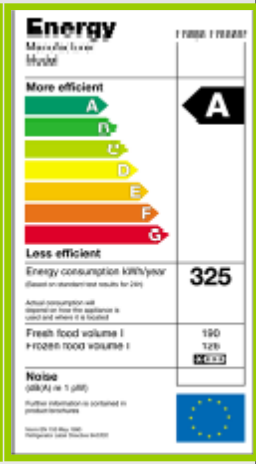
President of CRES

October 9, 2009

EU is the fire- lighter for an Energy Revolution

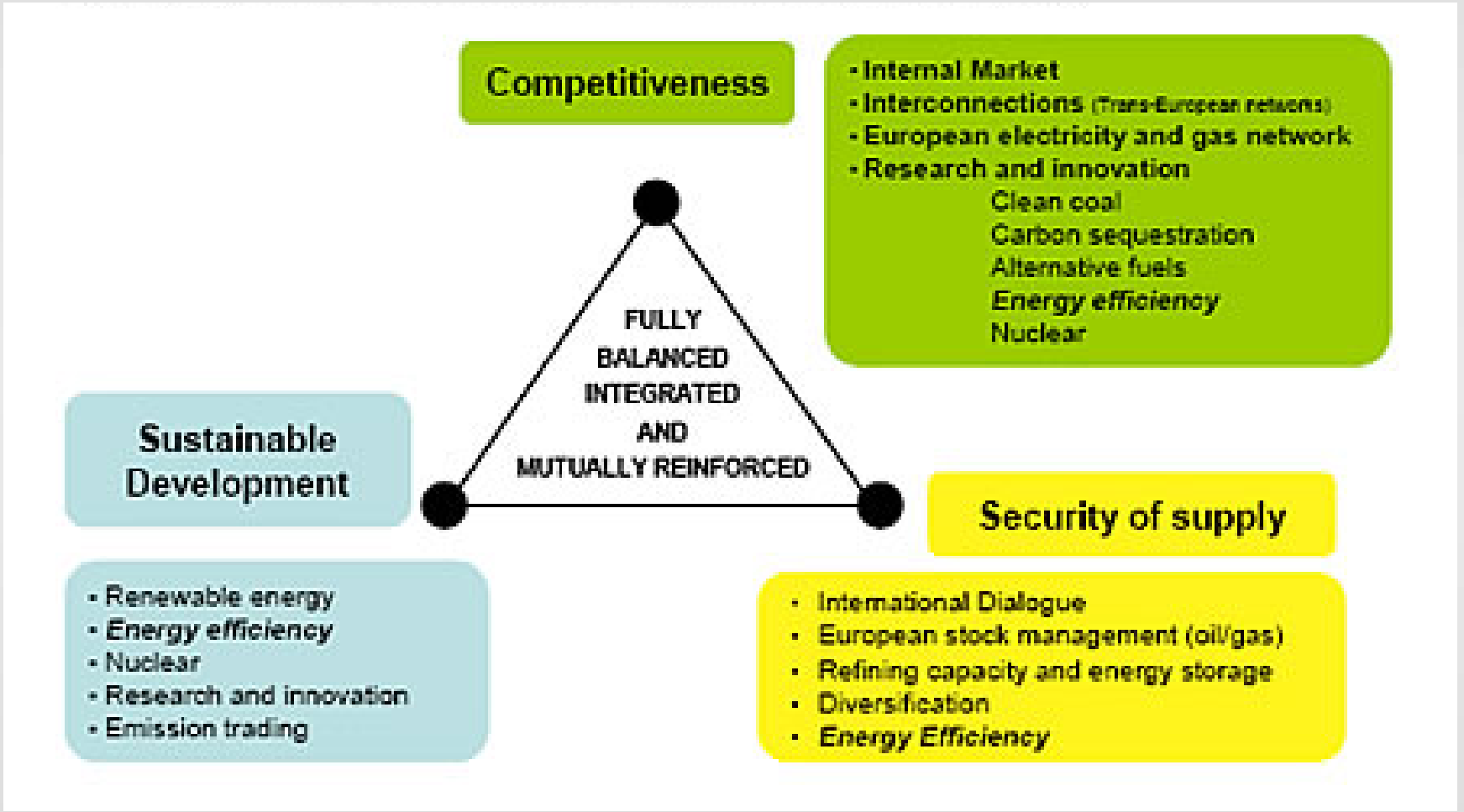






<u>Three basic points</u>

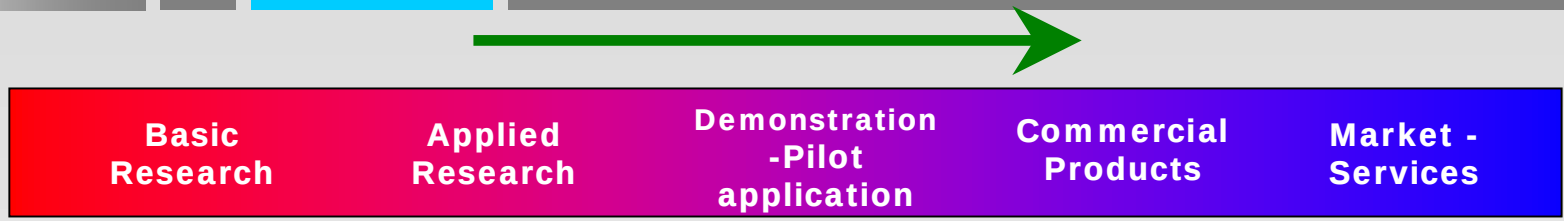
- **Competitiveness (Treaty of Lisbon)**
- **Security of supply**
- **Sustainable development (Protocol of Kyoto)**


Competitiveness
• Internal Market
• Interconnections (Trans-European networks)
• European electricity and gas network
• Research and innovation
Clean coal
Carbon sequestration
Alternative fuels
Energy efficiency
Nuclear
FULLY
BALANCED
INTEGRATED
AND
MUTUALLY REINFORCED
Sustainable Development
• Renewable energy
• Energy efficiency
• Nuclear
• Research and innovation
• Emission trading
Security of supply
• International Dialogue
• European stock management (oil/gas)
• Refining capacity and energy storage
• Diversification
• Energy Efficiency

The new European Energy Policy focuses on the strategic target of decreasing the emission of greenhouse gases by 20% until 2020, as compared to the 1990 levels.
This requirement can be met by achieving the compliance of three interconnected binding targets for the same period:

- **Increasing the share of renewables in energy use to 20%**
- **Saving 20% primary energy compared to projections for 2020**
- **A 10% contribution of biofuels in transport**



Wind

Biomass

Geothermal

Wave energy

Small Hydro

Hydrogen technologies

PV & Decentralised Production

Solar Thermal

Buildings / EE technologies

Transport

Barriers

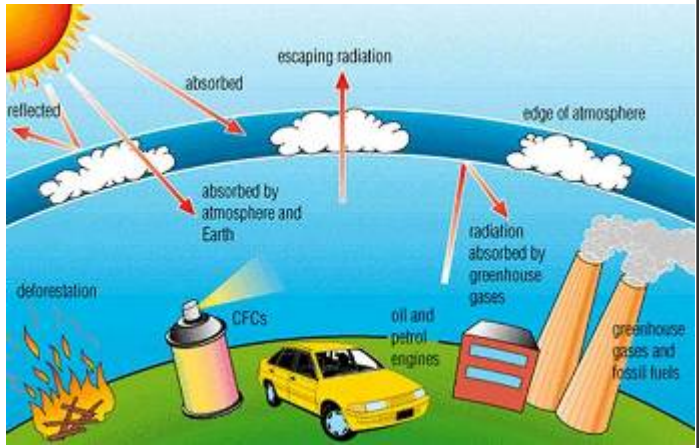
- External costs of energy use (air pollution etc) are not fully reflected in energy prices
- Important learning curve effects which would lead to lower prices are exploited slowly due to low demand
- Administrative and market barriers and fragmentation of support systems
- Innovation must confront established investment (based on CO_2) with predominant leaders, imposed prices, regulated systems and grid connection difficulties
- In short, no natural market appetite, no short –term benefit for RES technologies:

The so - called valley of death for low carbon technologies

The report "Lead Markets Initiative", produced by the European Commission, suggests the following sectors as the most promising for development:

- **Renewable Energy Sources**
- **Recycling**
- **Sustainable constructions**

According to the action plan of this initiative, there have to be established several policies to remove innovation barriers in these fields.



EU Policies to remove innovation barriers

Objectives	Actions
Promote the internal Market in renewable energies	- Create the framework for opening the market for guarantees of origin - Set out environmental sustainability criteria
Simplify authorisation procedures	-Remove planning and certification barriers -Incorporate renewable energy in building codes -Provide guidelines for authorisation procedures -Eliminate red tape for SMEs

EU Policies to remove innovation barriers

Objectives	Actions
Coordinated approach for standard setting and labeling	Adopting minimum energy performance standards
Develop European sustainability standards	-Creation of a biofuels sustainability regime -Consider the extension to other areas

EU Policies to remove innovation barriers

Objectives	Actions
Mobilise public and private financing	Strengthen the EU support to bridge the gap between successful demonstration of innovative technologies and effective market entrance
Future qualifications to uptake innovation	Develop an EU-wide strategy to facilitate the up-grading of skills and competencies in renewable energies

Green entrepreneurship & Development

What about the companies in general

Has something changed?

- energy needs represent a substantial part of yearly expenses
- legislation & regulations are strict with environmentally «indifferent» companies (emissions trading scheme, prohibition of conventional light bulbs etc.), and reward environment – friendly activities (electricity generation from RES)
- «green» labeling creates a new market aiming at informed customers gains larger shares every day (tourism, transport, home appliances, energy services)
- energy performance will very soon be a parameter for evaluating buildings (energy certificate)
- companies with a proven environmental friendly profile and with high energy efficiency can use this as a marketing tool (activities of social responsibility, voluntary agreements)

Green entrepreneurship now & in the past

Now:

Entrepreneurship & Development

Environmental protection & rational energy use

Later:

Entrepreneurship & Development

Environmental protection & rational energy use

Before:

Entrepreneurship & Development

Environmental protection & rational energy use

Benefits of a climate change program for a company

- Significant cost savings given the current and likely future costs of energy
- Sellable carbon credits in carbon markets likely to be fortified under new rules
- Better competitive sales position through a life cycle assessment (LCA)
- Provide “green” context for products, which can promote sales
- Raise publicity quotient to shareholders and raise employee morale
- Determine company’s physical, regulatory, financial climate change risks

Priorities of the private sector for facilitating new energy

(International Chamber of Commerce)

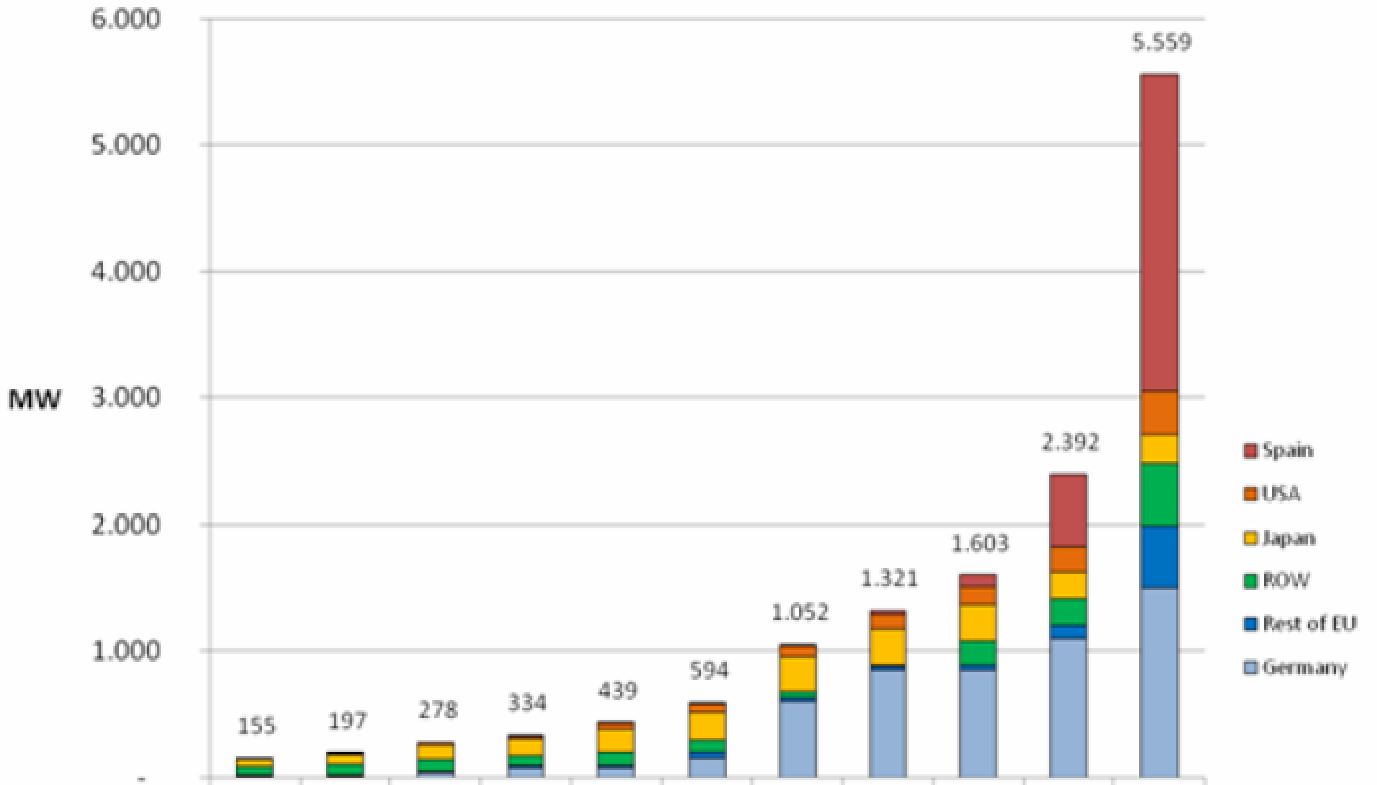
- R&D investments for innovative energy technology have to increase
- Partnerships and collaborations to develop breakthrough technologies
- Emerging – not yet commercial technologies to be fast tracked
- Joint funding of large scale demonstration projects
- Fiscal and regulatory framework for energy efficiency
- No one-size-fits-all solution exists.

Technology challenges for the next ten years

(SET Plan)

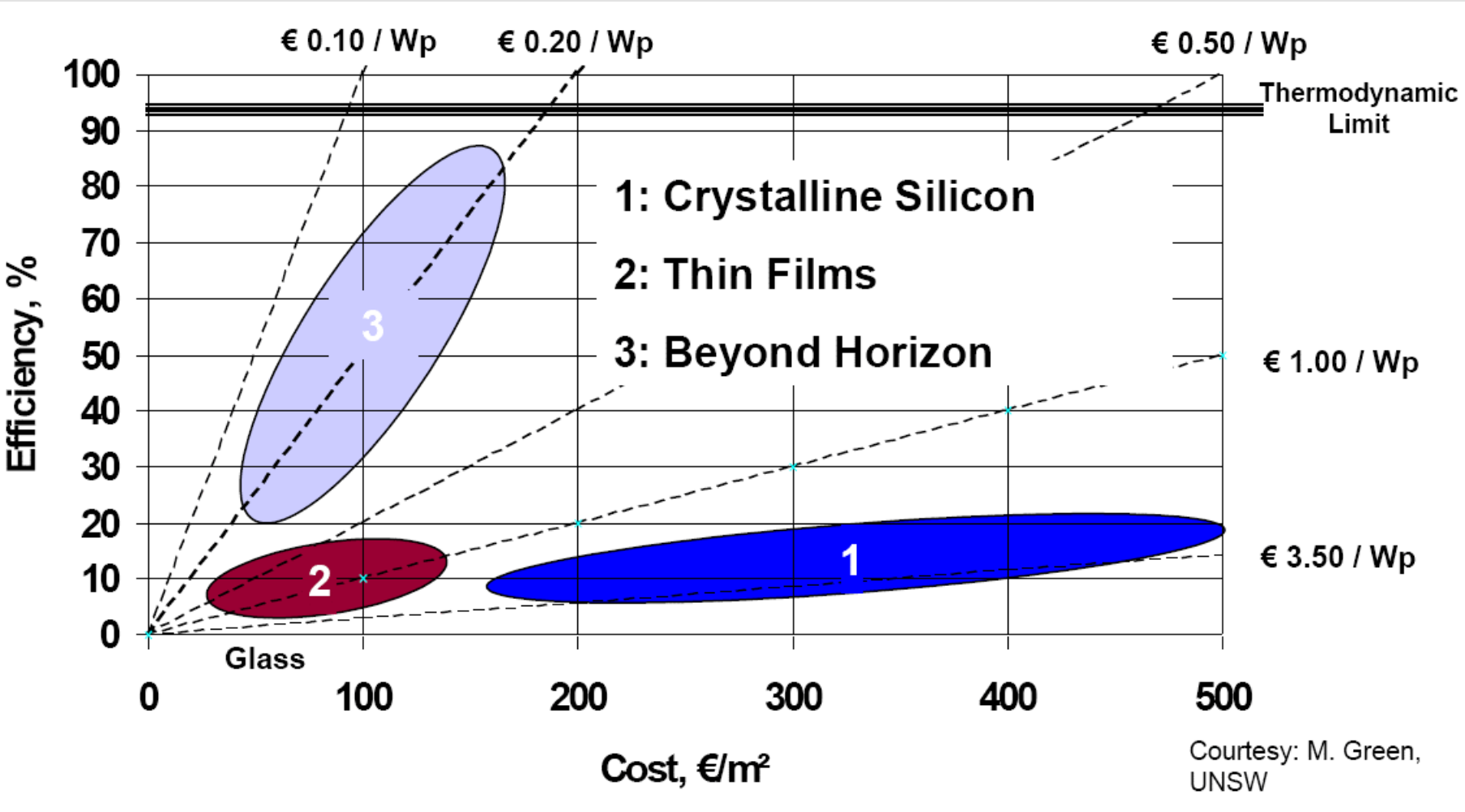
- Competitive second generation biofuels
- Double generation capacity of wind turbines, off-shore wind
- Large scale solar plants
- Enabling a single smart European grid
- Efficient systems for buildings, transport, industry
- Waste management solutions
- Commercial use of CCS technology

Regional development of the Global annual PV market



	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
Spain	0	1	-	2	9	10	6	26	88	560	2.511
USA	-	17	22	29	44	63	90	114	145	207	342
Japan	69	72	112	135	185	223	272	290	287	210	230
ROW	68	84	94	75	104	98	53	12	196	207	485
Rest of EU	8	11	10	16	16	50	30	30	37	108	492
Germany	10	12	40	78	80	150	600	850	850	1.100	1.500
TOTAL	155	197	278	334	439	594	1.052	1.321	1.603	2.392	5.559

Efficiency and cost of 3 generations PV



Landmarks for PV technology

Year	1980	1995	2009	2020	2030	Long term potential
Typical cost of installed PV systems *(Euro/Wp)*	> 30	10	3 - 4.5**	1.5 -2.3	< 1	0.5
Typical production cost assuming 1300 kWh/kWp·year *(Euro/kWh)*	> 2	0.7	0.20 – 0.30	0.10 – 0.15	< 0.07	0.03
Efficiency of commercial flat panels (max)	8%	12%	20%	23%	25%	40%
Efficiency of commercial concentrated panels (max)	(~10%)	20%	30%	35%	40%	60%
Energy Payback period	> 10	> 5	< 2	< 1	0.5	0.25

World Wind Energy Association

Technological development for wind turbines

- **Increase in size and capacity up to** 10+ MW (180 m diameter) in order to improve viability of large off shore parks
- **Improvement of** reliability in design methods, construction (elimination of uncertainty by further automation and new materials) and maintenance (diagnostic methods, condition monitoring etc)
- Adaptation to **sea** conditions, further sea depths floating turbines

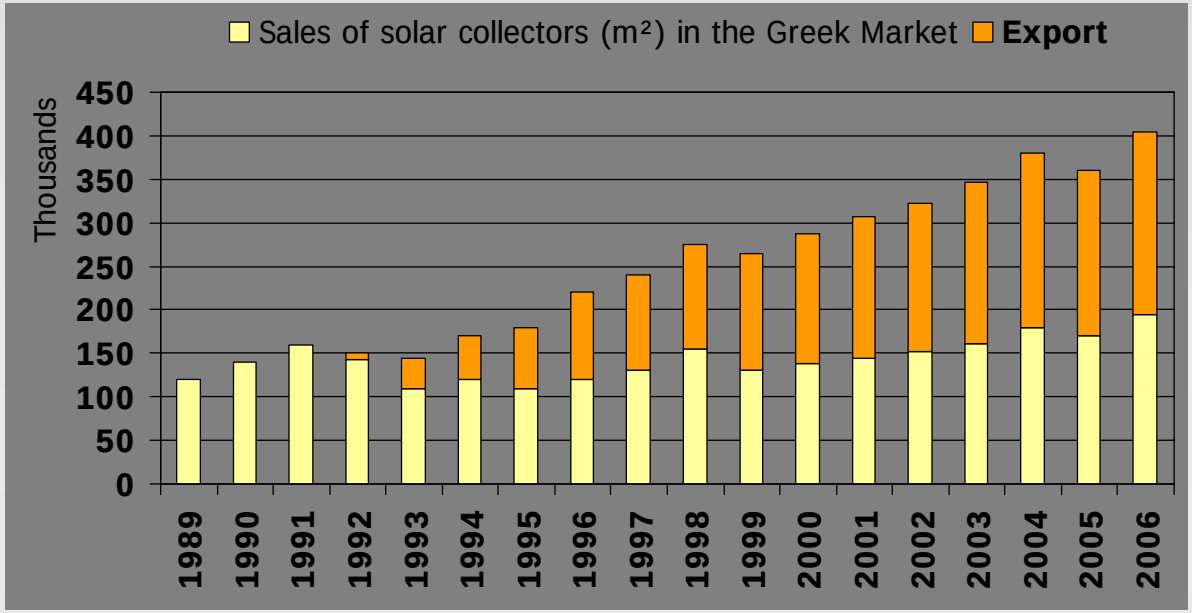
Solar Thermal Systems

Greece is ranked 3d in Europe for STS installed capacity after Germany and Austria.

In per capita capacity, Greece is 4th worldwide (after Germany, Austria and Cyprus).

There are over 100 companies (from large manufacturers to commercial SMEs).

There is a recent drive for R& D especially concerning heating and cooling. Also the new tool of ESCOs is being rapidly introduced.



STS PRODUCTION AND EMPLOYMENT IN GREECE

		1995	2005	2010	2020
Manufacture *(m²)*	Mainland	160000	340000	450000	540000
	Islands	20000	40000	50000	60000
Employment	Mainland	2250	3400	4200	4500
	Islands	250	370	460	500
TOTAL		2500	3770	4660	5000

Source: EBHE

The new ERA

- ✓ A new energy ERA is proposed for Europe in 2050
  - **E**nergy efficiency, **R**enewables and clean thermal generation and **A**dvanced state-of-the-art grid and storage infrastructure
- ✓ This new energy model must be supported by 4 main principles
  - Efficiency, Low carbon content, Decentralization and Holistic approach

New infrastructure vision, efficiency and decentralization