

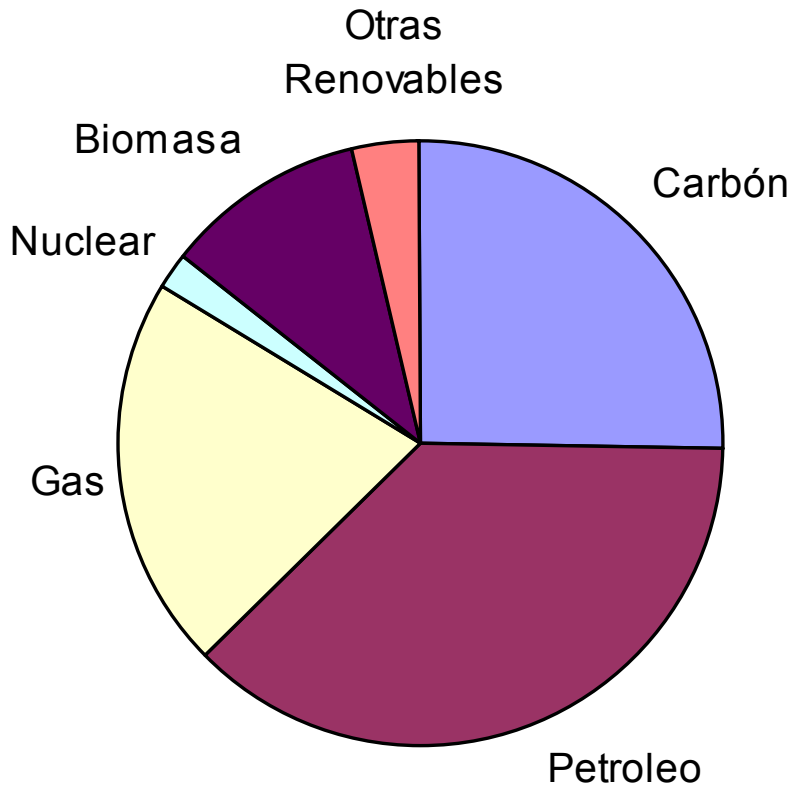
WORKSHOP ON PV ENERGY

THE STRATEGY OF EPIA IN EUROPE

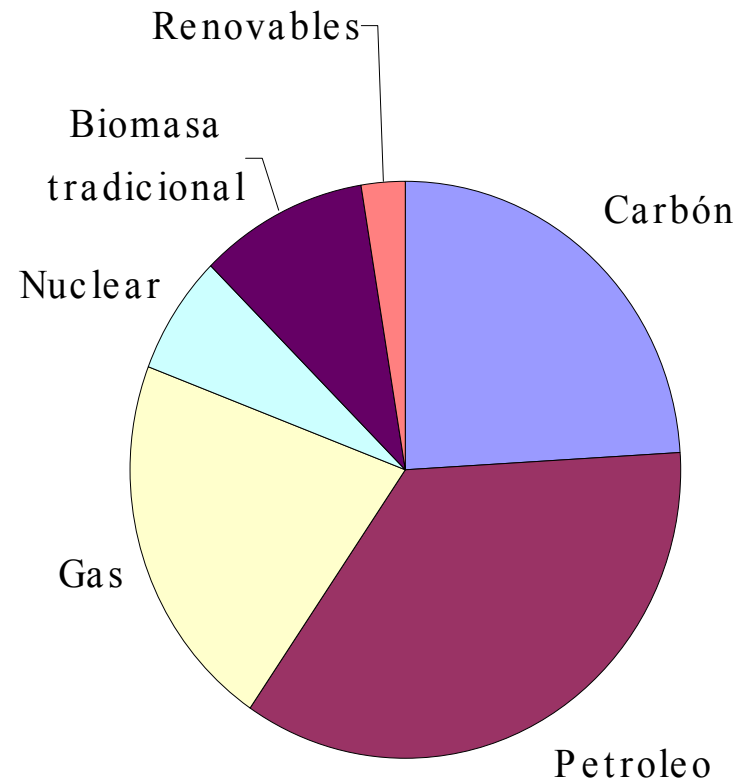
Ernesto Macias Galan
EPIA President

Energy Demand 2000 - 2030

ES

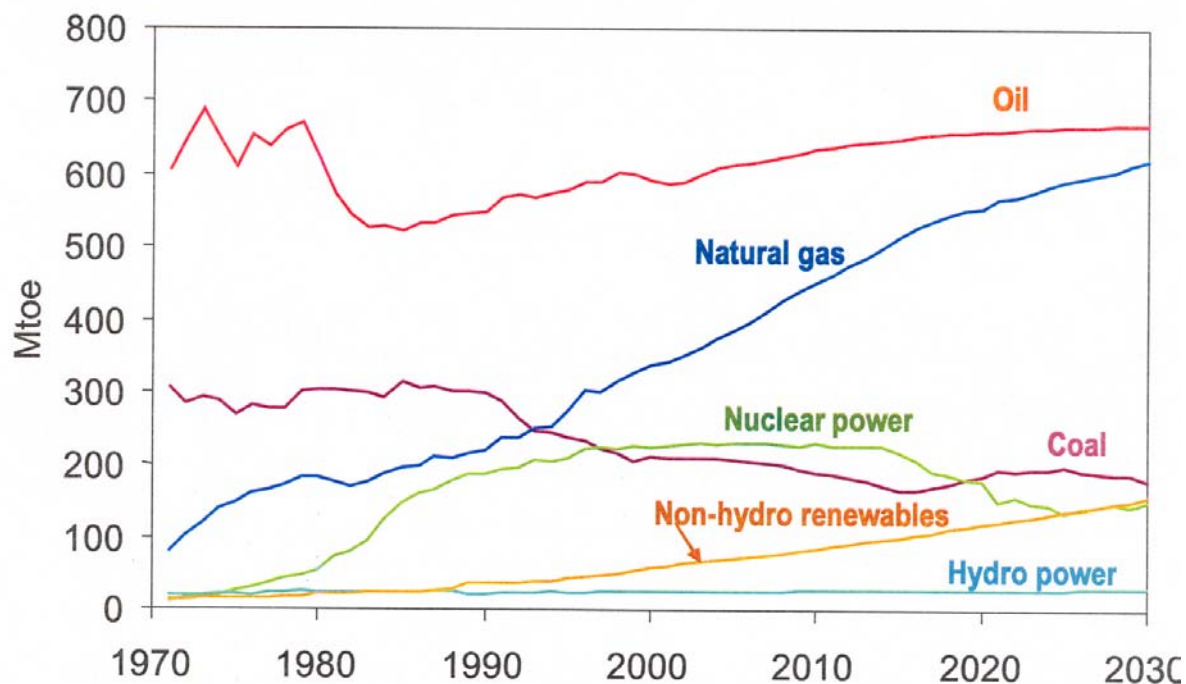


BAU



Source: IEA, EU

EU-15 Primary Energy Demand



Source: IEA



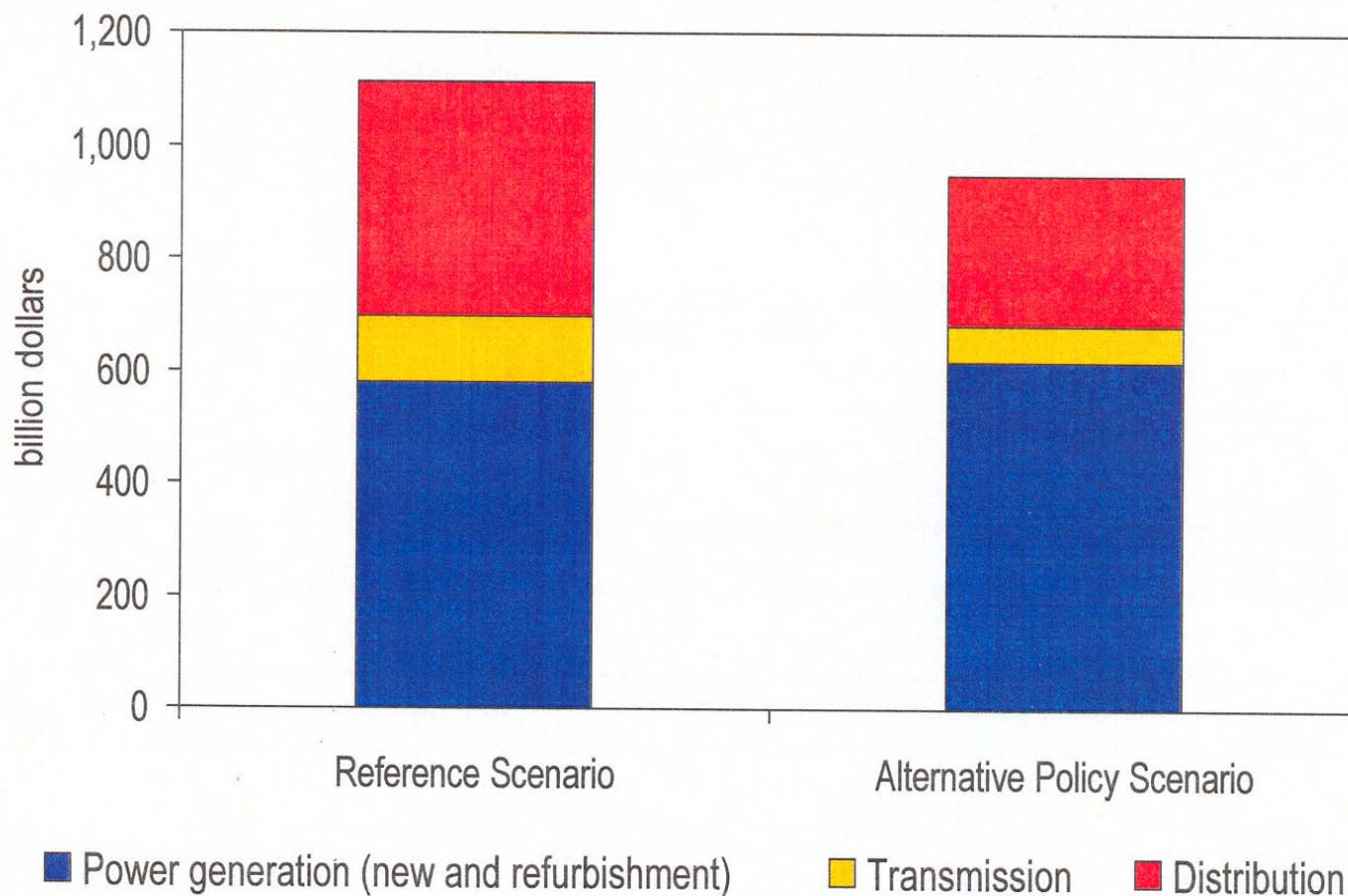
2050 Forecast - Sustainable Scenario (IEA)

World

	CO2 Tons / Capita	Population (MM)	Tons of carbon (MM)	GtC anually	GtC acumulated
2000	1,127	6.130	6.908	6,91	6,91
2010	1,159	6.830	7.915	7,92	81,87
2020	1,206	7.540	9.093	9,09	167,40
2030	1,305	8.130	10.609	10,61	267,50
2040	1,238	8.600	10.646	10,65	376,76
2050	1,148	8.918	10.237	10,24	484,27

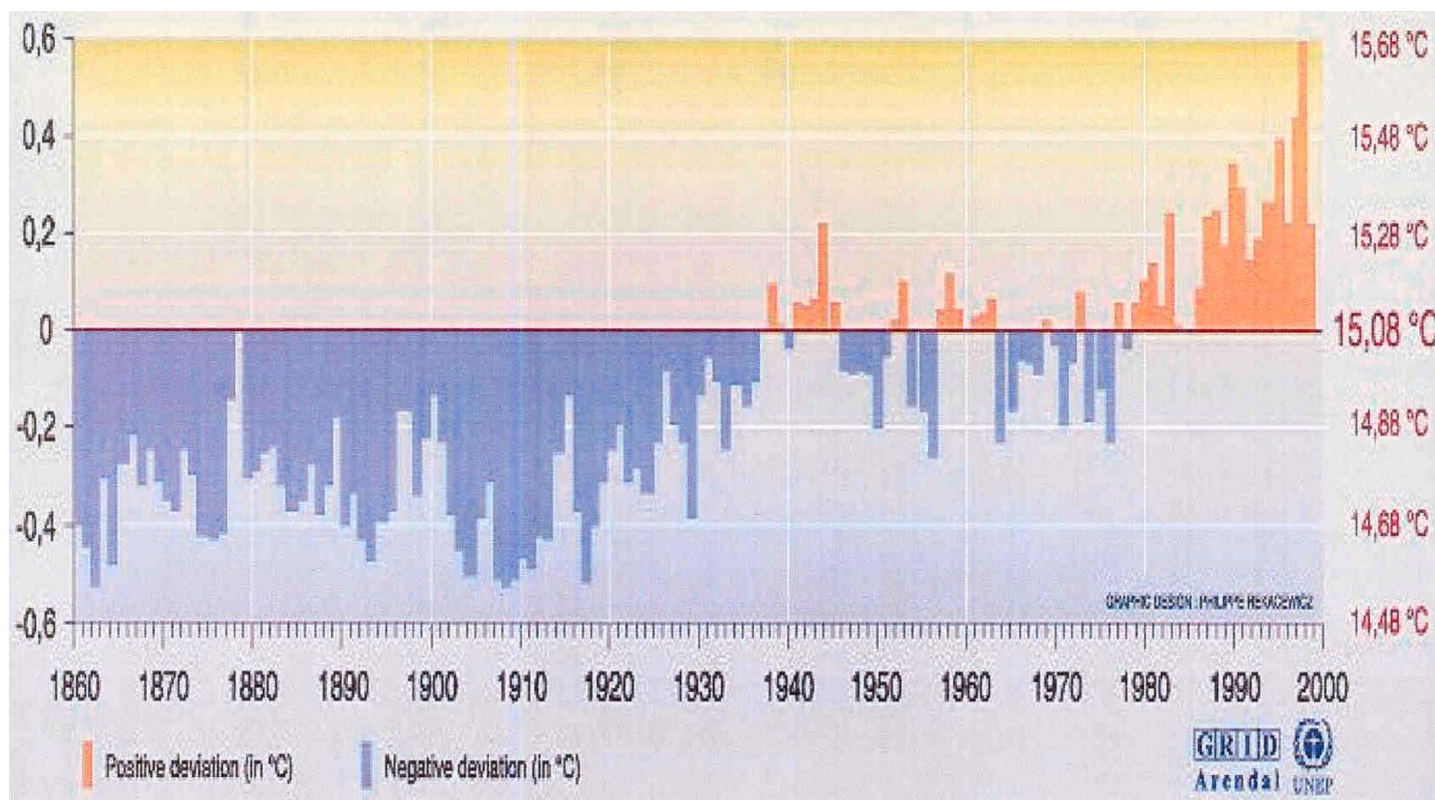
Source: IEA

EU Energy Investment in two different scenarios



Source: IEA

Trend in Global surface Temperature



Fuente: WWF

**Renewable Energies are
essential for the well
being and sustainable
development of our
Planet.**

**In what do we trust for the
development and promotion in mass
scale of photovoltaic technology?**

1. In the historic evolution of the technology and the constant decrease of the production costs.

1955: 3% efficiency cells

1957: Hoffman ELECTRONICS develops 8% efficiency cells

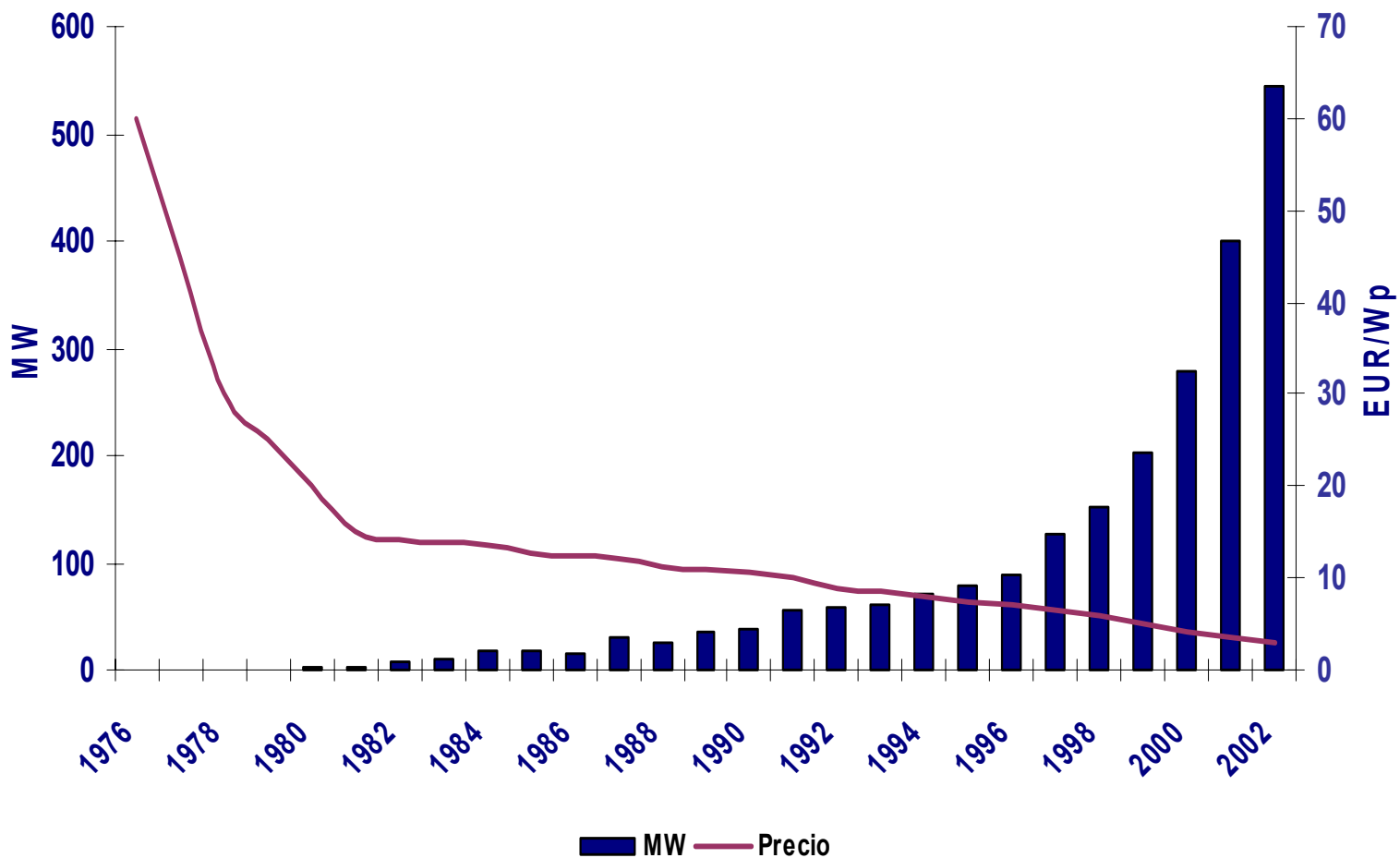
1959: Cells of 10% efficiency are produced

1985: Modules with an 8% efficiency are sold

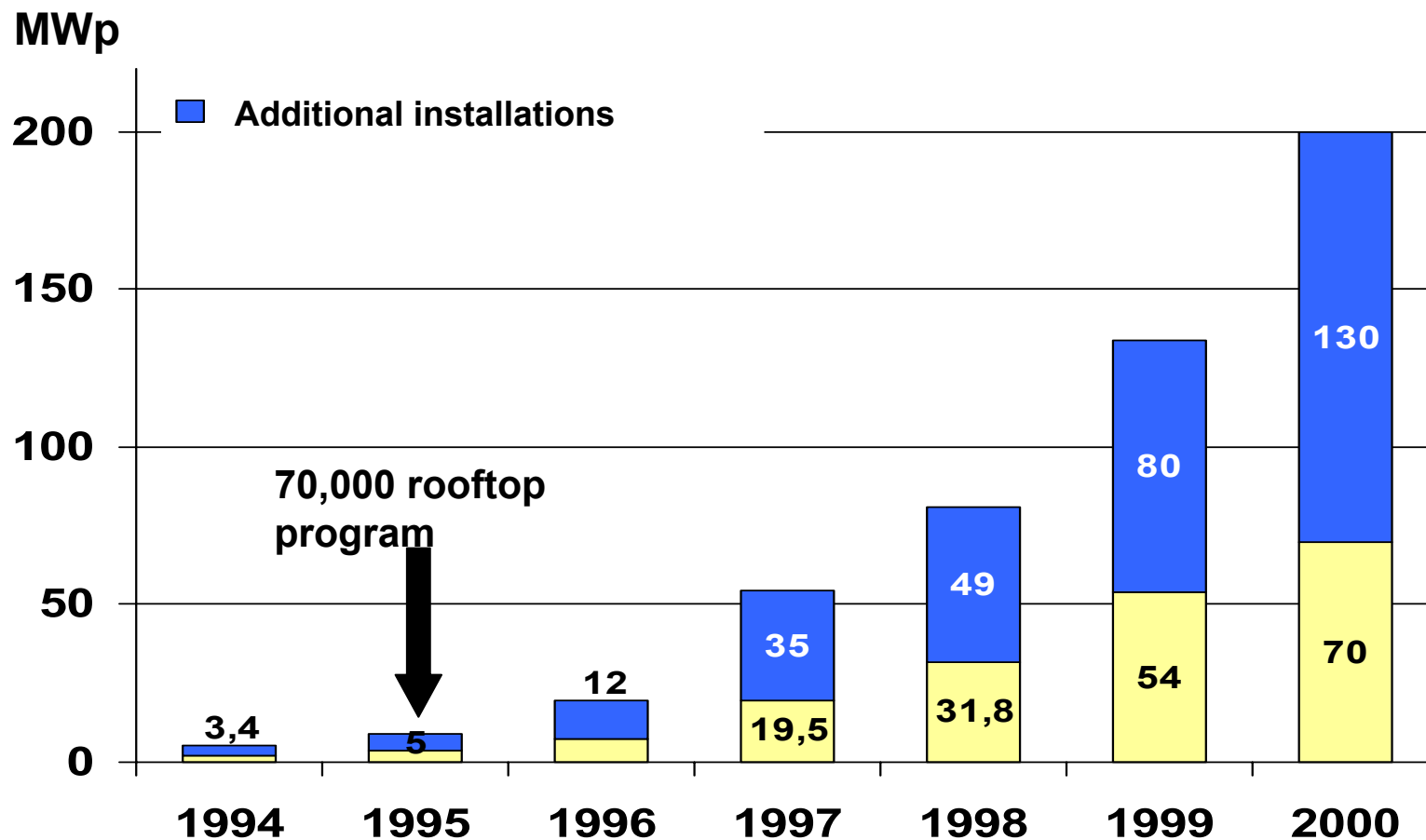
Nowadays modules with 16% efficiency are being commercialized



Historic evolution of cost vs. production

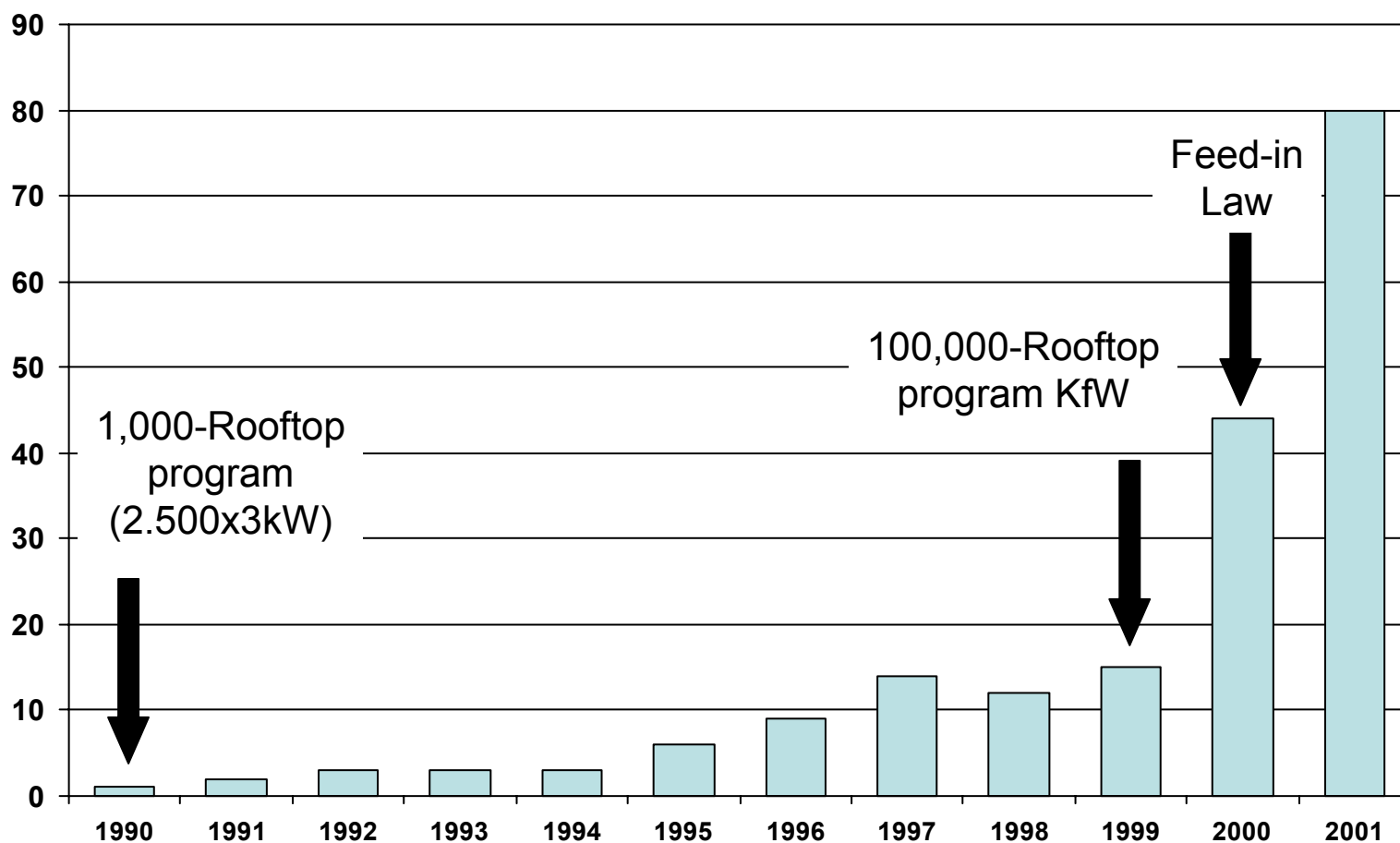


Annual PV installations in Japan



Quelle: Jap. PV Association

Annual PV installations in Germany

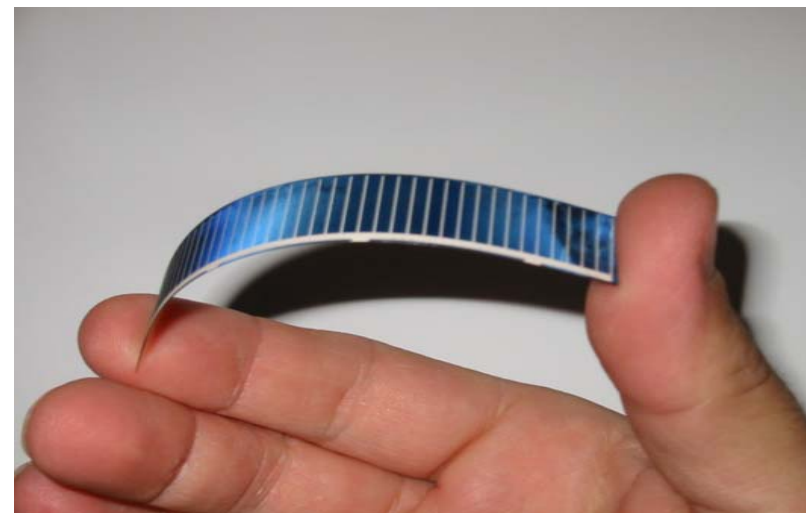
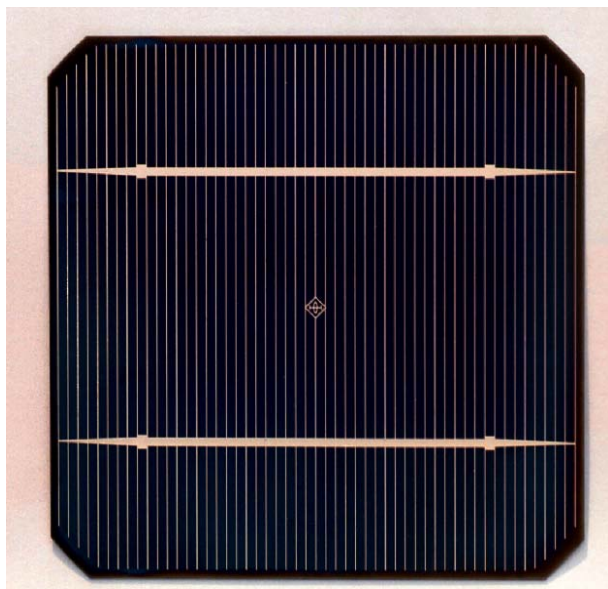


2. In the medium and long term technological breakthroughs, and the continuous cost decrease of the production process, that will make photovoltaic price competitive against utility companies.

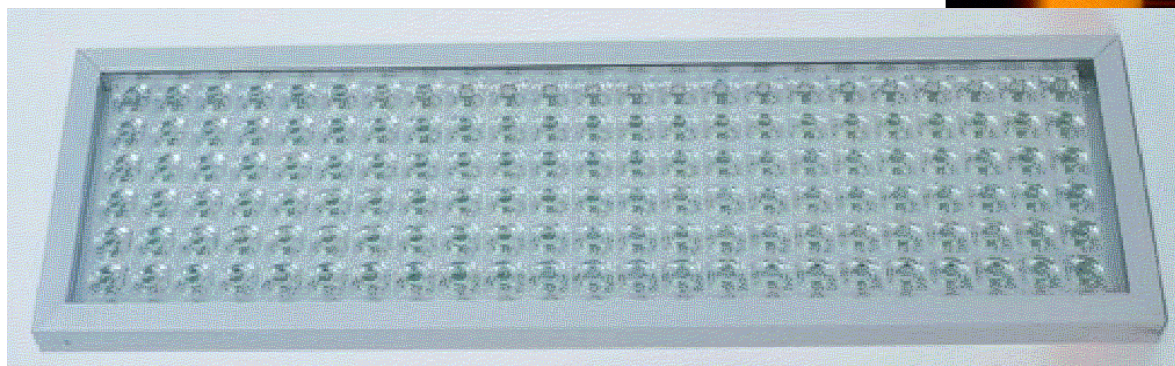
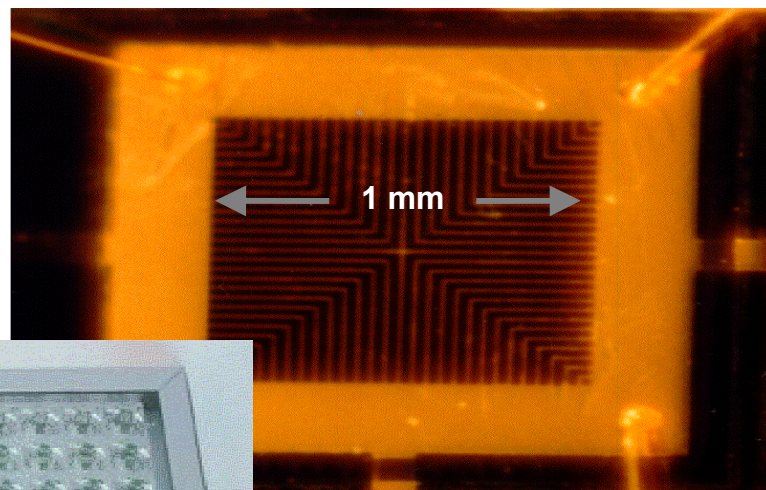
Technological advances in the production process will reduce amount of raw material use in monocrystalline and polycrystalline wafers from 16 g/Wp to 10 g/Wp, reducing the thickness from 300 μm to 180 μm , with material lost of less than 160 μm .



Monocrystalline solar cells have the potential to improve efficiency in the medium term from **16.5% to 20%**, while polycrystalline could increase from **14.5% to 18%**. Furthermore, there will be substantial improvements with thin film technology and cost reduction.

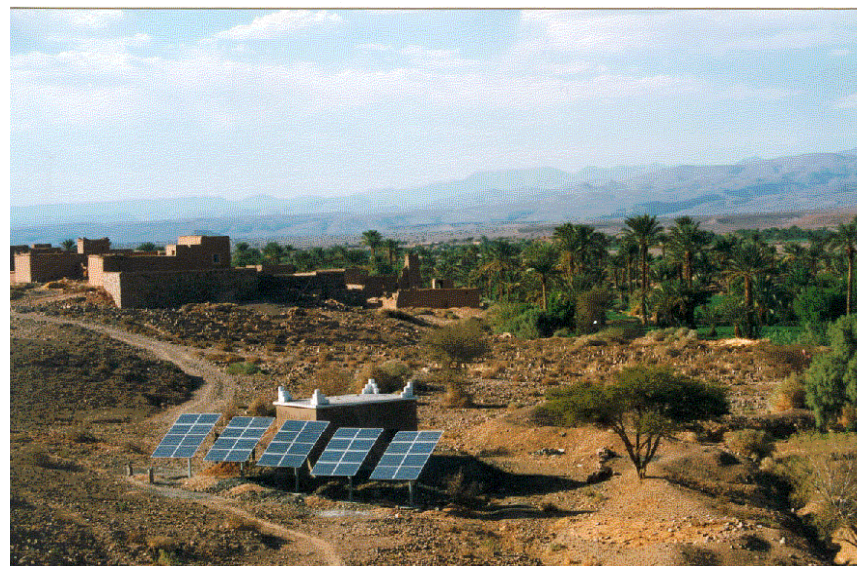


Concentration technology will be economically viable, due to cost reduction through the substitution of expensive material (solar cells) with cheaper ones (optical elements), with very high efficiency, of more than **30%**.






Among other mid-term improvements that will contribute to the development and growth of the PV industry we can mention:

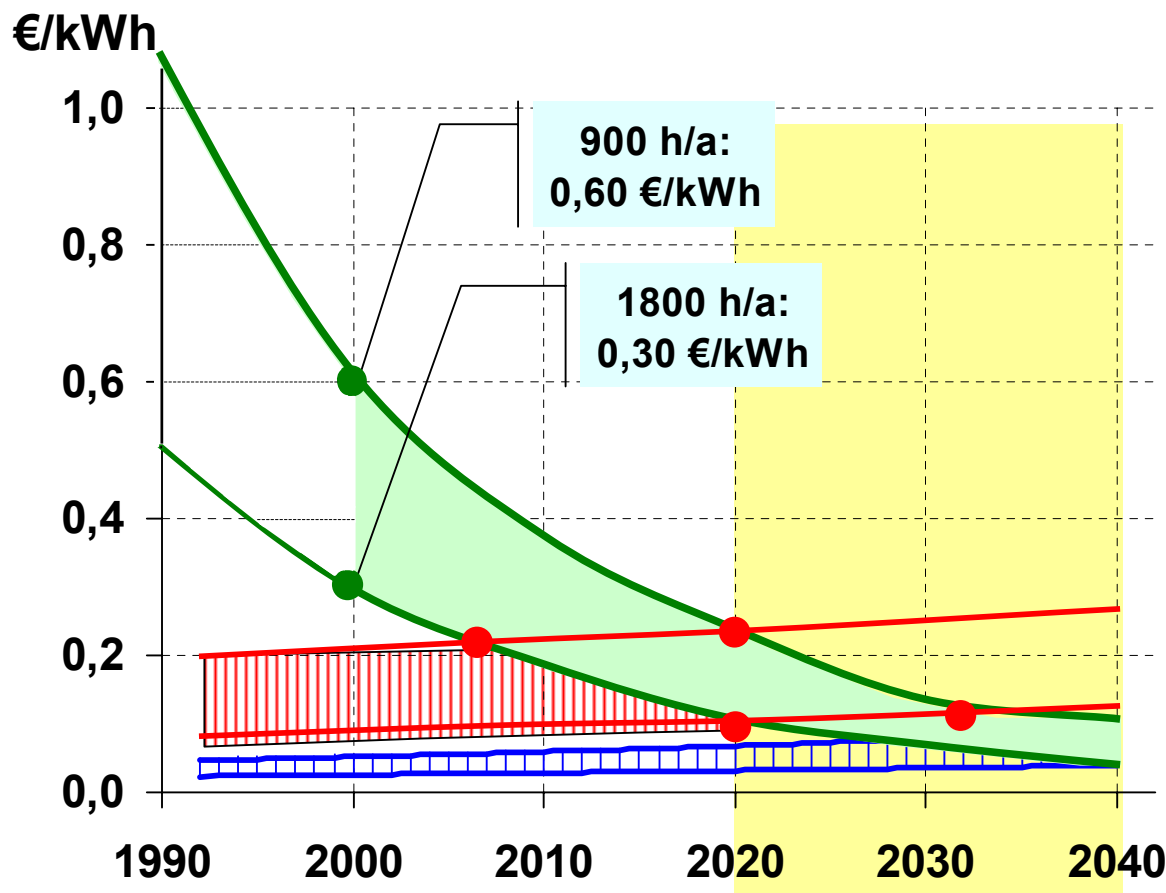
1. Modules will become standard pieces for **architectural integration**.
2. **Grid connected systems** will have competitive prices per kWp that will compete with utility companies.
3. Better and more efficient **stand alone systems** and energy storage.



PV Competitiveness

Electricity Generating Cost for PV and utility prices

-  Photovoltaics
-  Utility peak power
-  Bulk power



PV IN EUROPE TODAY

European PV market today represents:

- **More than 15.000 jobs**
- **1 billion € annual turn over**
- **Market growth 2002-2003 of 33%**
- **High technology products**
- **Research and innovation**
- **Highly qualified employees**

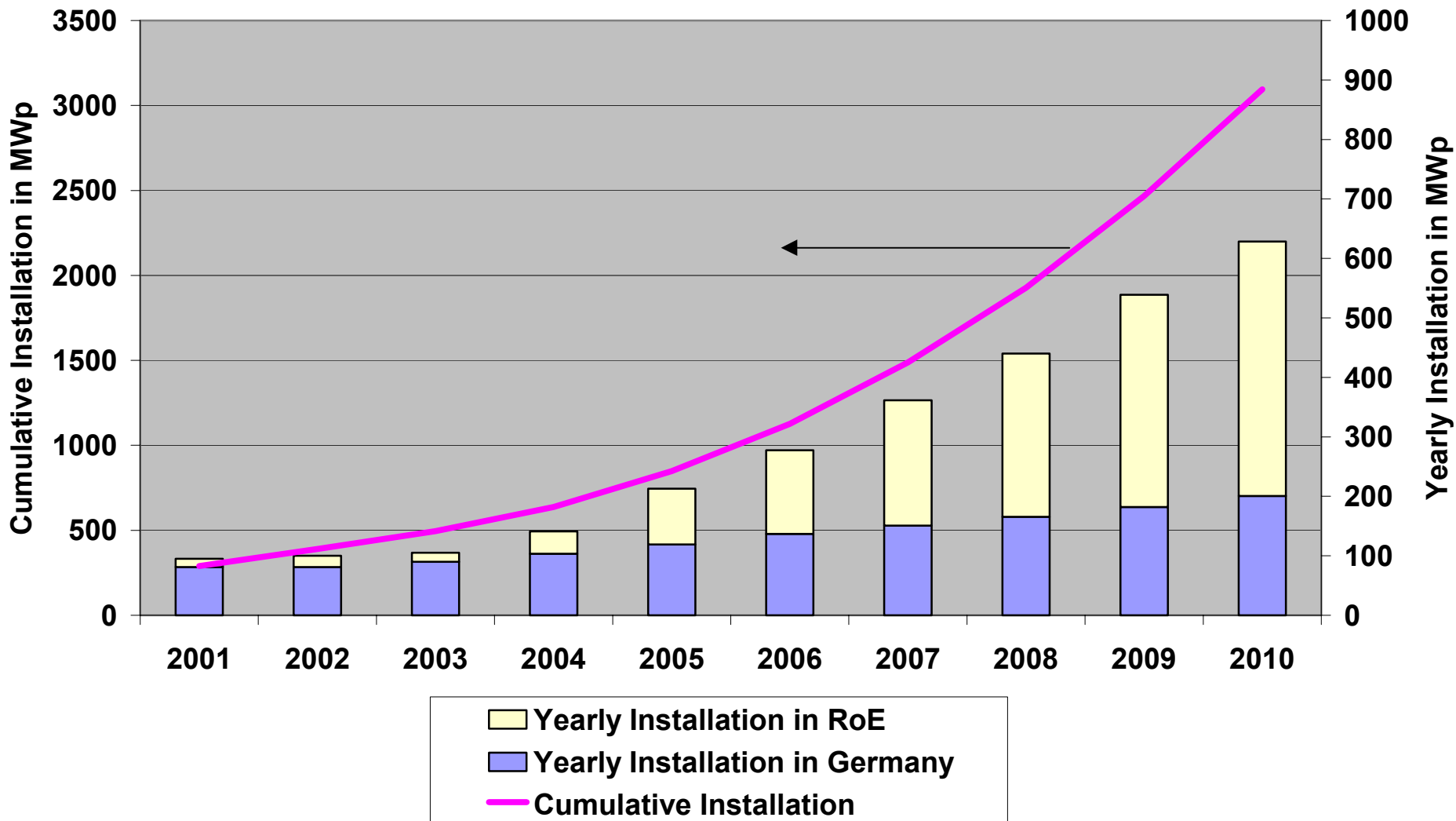
PV Programmes in EU-15 today

PAÍS	INICIATIVA
Austria	Investment Subsidies (Different In the different Federal States) Feed-in tariff (but only for 2003-2004) RES target quotas
Denmark	Renewable Energy Portfolio Solar roof projects Net meeting
Finland	Investment subsidies for demonstration projects Green energy
France	Tax exemption law in the Overseas Department Investments subsidies for isolated sites Feed in tariff
Germany	Feed in tariff New PV bill
Italy	Feed in tariff 10000 Roof Programme

PV Programmes in EU-15 today

PAÍS	INICIATIVA
The Netherlands	Renewable Energy Portfolio Investment subsidies Green tariffs Tax incentives for companies
Portugal	Feed in tariff. Grants for investments
Switzerland	Feed in tariff. Green tariffs Investment subsidies
United Kingdom	Investment subsidies (so far only for demonstration projects) Investment grants Reduced VAT for professional installations on PV systems (5%)

PV Market Development Projection in Europe



A successful support scheme: The German feed-in tariff

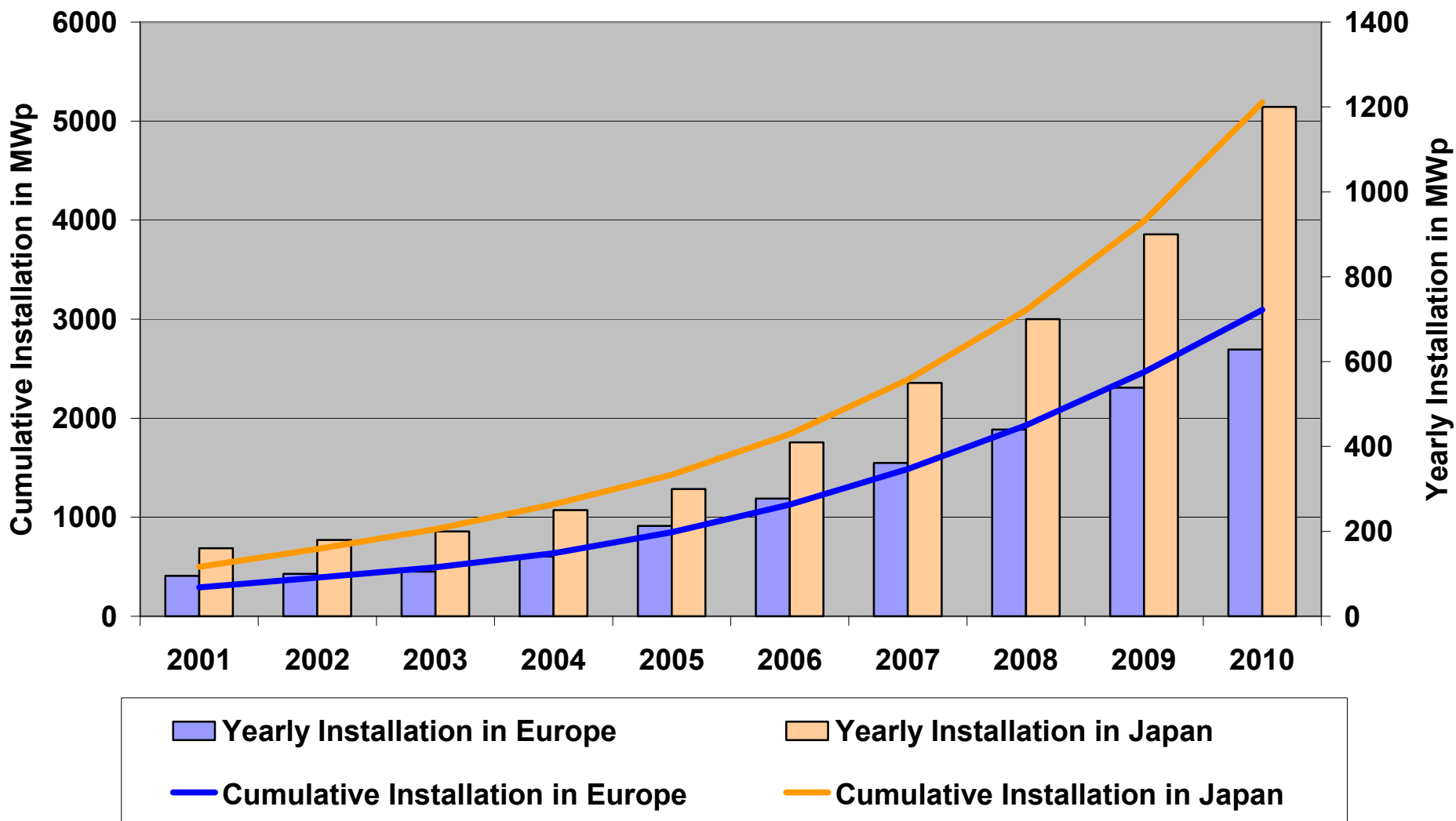
Support until 2003

- 1999: Soft loans (100.000 roof programme)
- 2000: Feed-in tariff: 0.5€/kWh with 5% decrease per year

New Feed-in law:

Feed-in tariff levels (euro cents/kWh)		
Built Environment	Rooftops	Facades
<30 kW	57.4	62.4
>30 kW <100 kW	54.6	59.6
>100 kW	54.0	59.0
Undeveloped areas	45.7	

Comparison of PV Market Projection in Europe and Japan



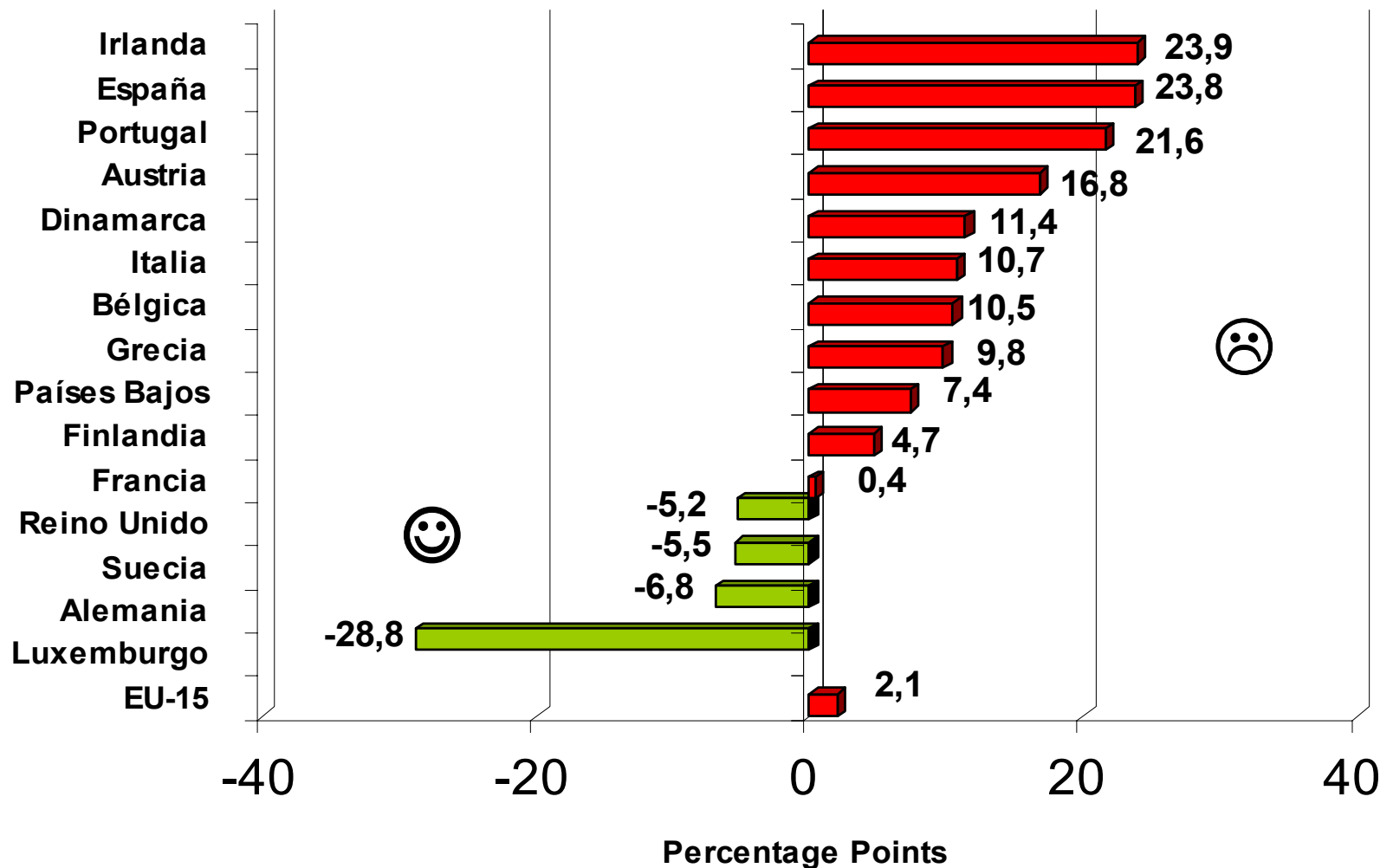
EPIA'S position:

- **Support an EU-wide feed-in tariff**
 - High level: 0.60 €/kWh
 - Long-term (20 years)
- **Remove Administrative barriers:**
 - Favourable conditions to make the feed-in tariff effective

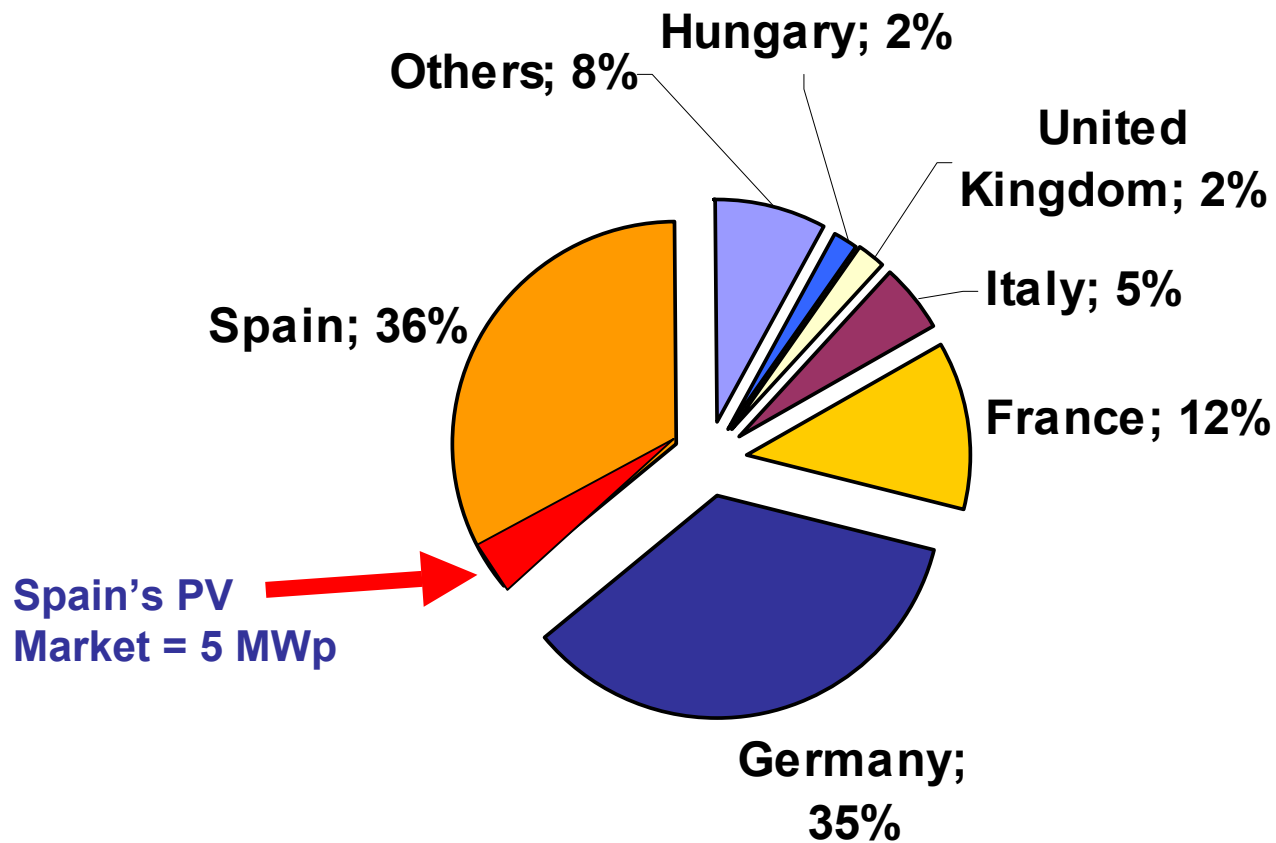
Advantages:

- Establishes a stable market
- Secures confidence of investors
- Strong and efficient support to the market
- Cost shared by all the consumers

Distance to Kyoto target for EU Members in 2001



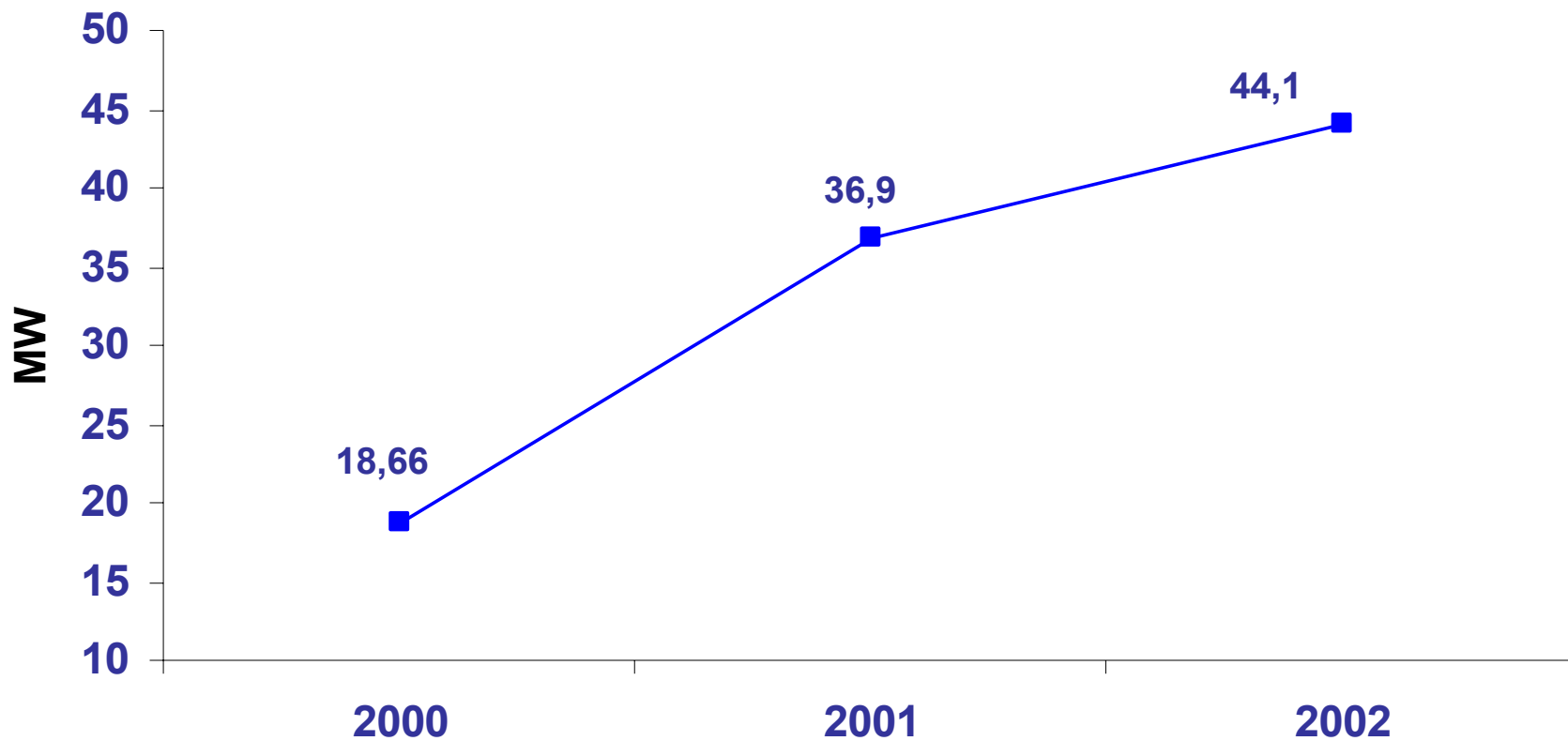
PV Production in Europe 2002



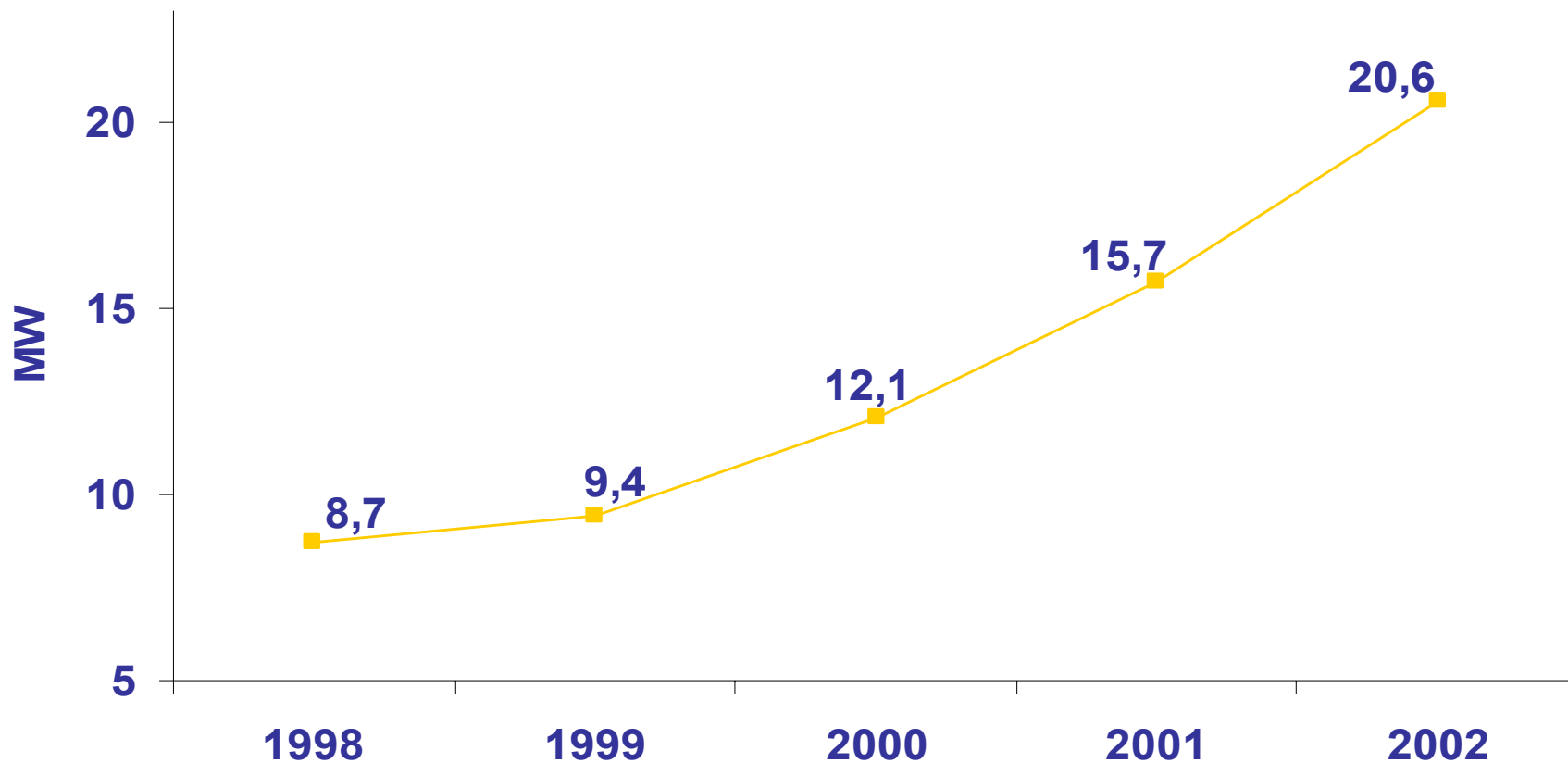
PV IN SPAIN TODAY



Production Evolution



Install Power Evolution



Manufacturers (2002)

Company	MWp	%
Isofotón	2,63	53,7
BP Solar*	1,5	30,6
Others	0,97	15,7
TOTAL	5,1	100

Source: DBK

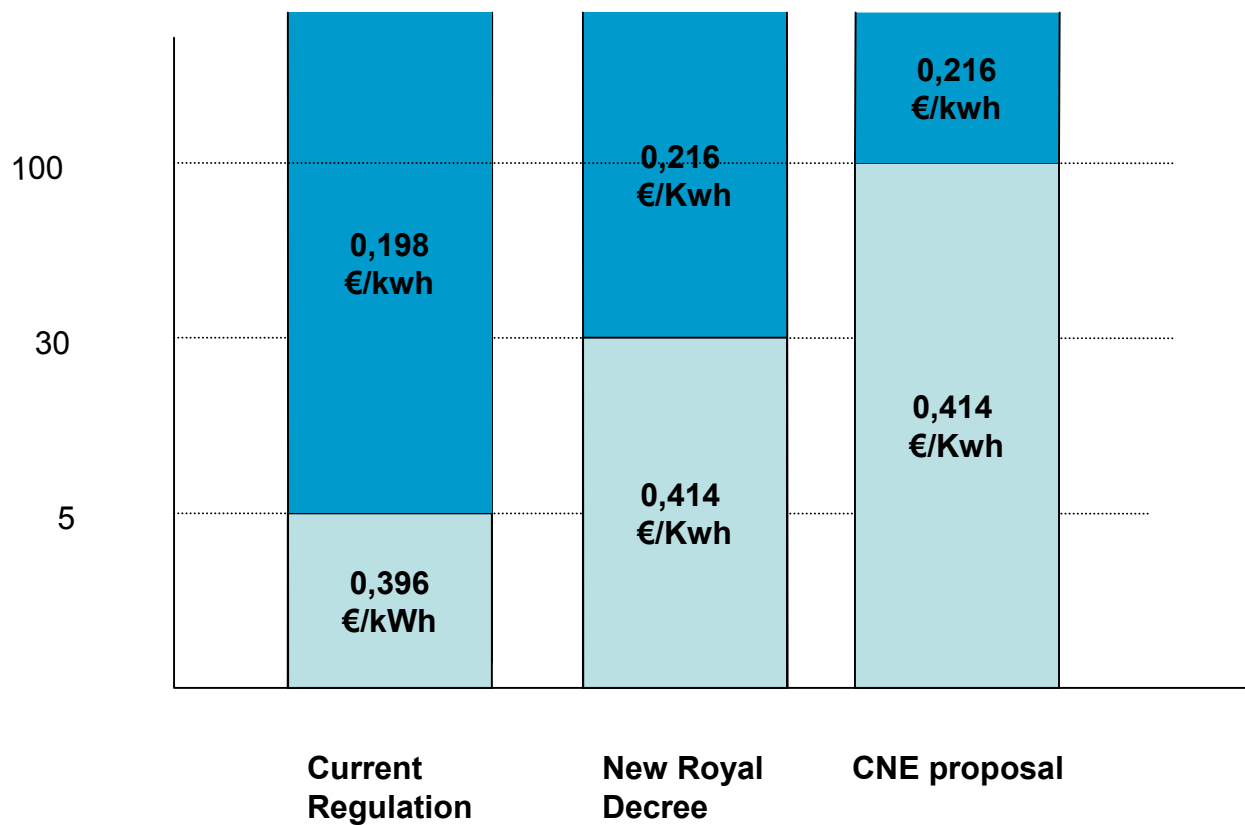
PV Jobs in Spain

**PV jobs in Spain in October 2003,
source ASIF**

	Direct	Indirect	Total
Cell and module manufacturers	1350	675	2025
Electronics and modules manufacturers	180	90	270
Installer	350	175	525
Others	800	400	1200
Total			4020

New Propose Royal Decree for the production of electric energy within the Special Regime in Spain

Changes in the propose Royal Decree



Changes in the propose Royal Decree

Fixed Price:

Current regulation:

There is no period guarantee for the collection of the fee.

Propose Royal Decree:

The collection of the fee is guarantee for the entire life of the installation

Over the first 25 years, the collection of the fee will be the same as the current while the installations was done.

From then on, the collection of the fee is still guarantee, but with a 20% reduction.