

## Unit H08 – Renewable Energies

### Photovoltaics as a Sustainable Energy Technology – the Resource Situation for Portugal



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## Renewables: Situation 2007

- Strong Growth, but not everywhere
  - Global + 25% / yr; ~65 Bio € in 2006 ,
- Conventional Energy Prices Rising Faster
- Climate Change Policies Gain Momentum
- Council Conclusions March 2007 with **2020** targets:
  - **20% Renewables (6.8% today)**
  - **20% less Consumption (-1%/year)**
  - **10% Biofuels (2.8% today, 2010 target: 5.75%)**

## Portfolio of the JRC's Renewable Energies Unit

- *How much and what Renewables do we have now, can we have in 5 years, 2020?*
- *What are the Costs of Renewables?*
- *Why are some Memberstates behind?*
- *What Technologies are Ready to reduce Energy Consumption?*
- *What are Effective Policies to Reach the Targets?*
- *What are the Resources Available in Memberstates?*
- *What is the Technology Portfolio of PV?*

## Action Portfolio

### Electricity End-Use Efficiency Renewable Energy

#### *Progress of Renewables*

#### *Biofuels*

##### *Well-to-Tank Study*

##### *Resources & Environmental Impact*

#### *Photovoltaic Solar Energy*

##### *Research*

##### *Resources and Costs*

##### *Performance*

##### *Lifetime*

*RefSys (13107):*

Reference System for  
Renewables and Energy  
Efficiency (9)

*BioF (13105):*

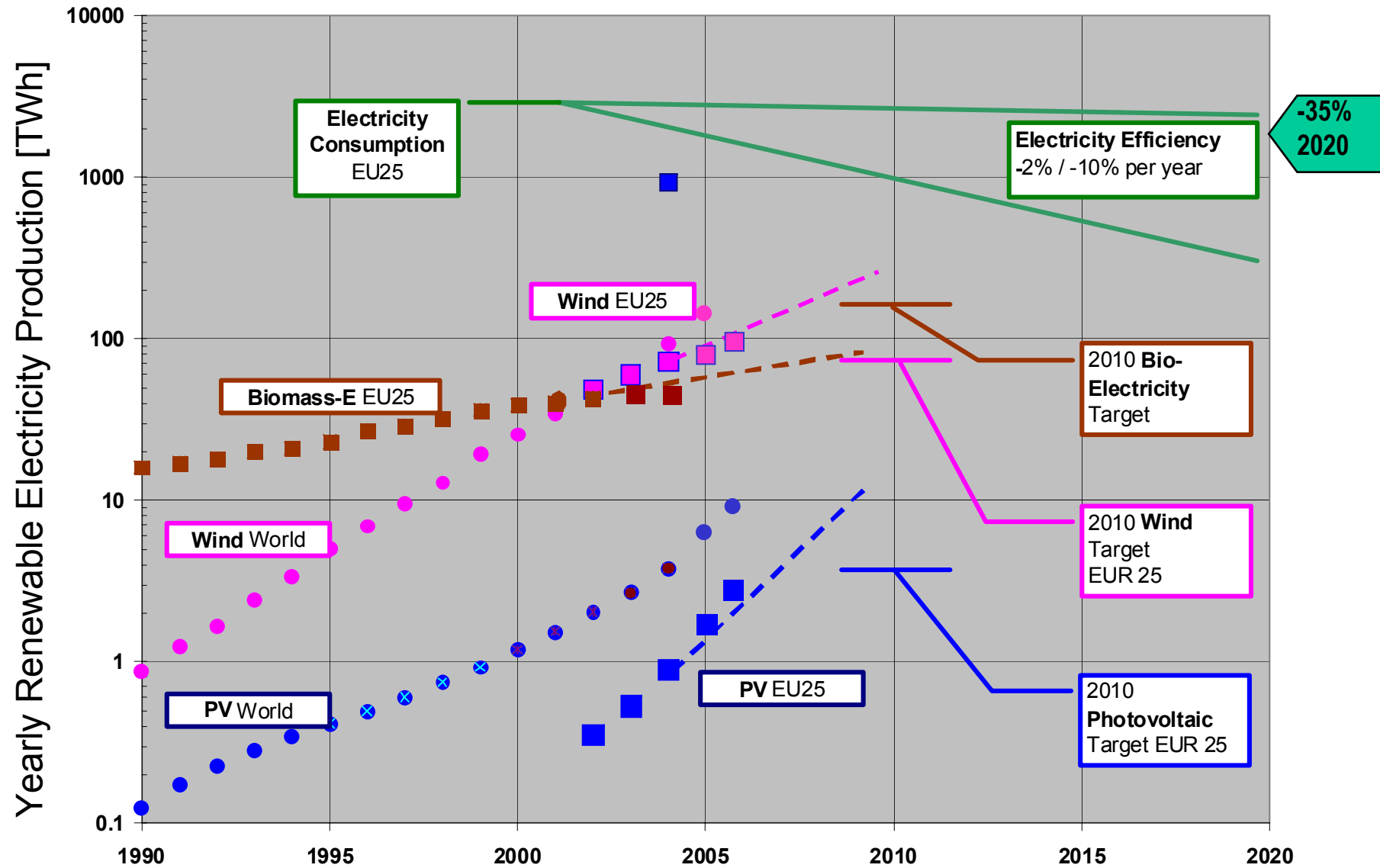
Bio-Fuels Quality &  
Performance (4)

*Solarec (13106):*

Solar Electricity (22)

*Total (H08):*

**35 R&D + 4 Ovhd**



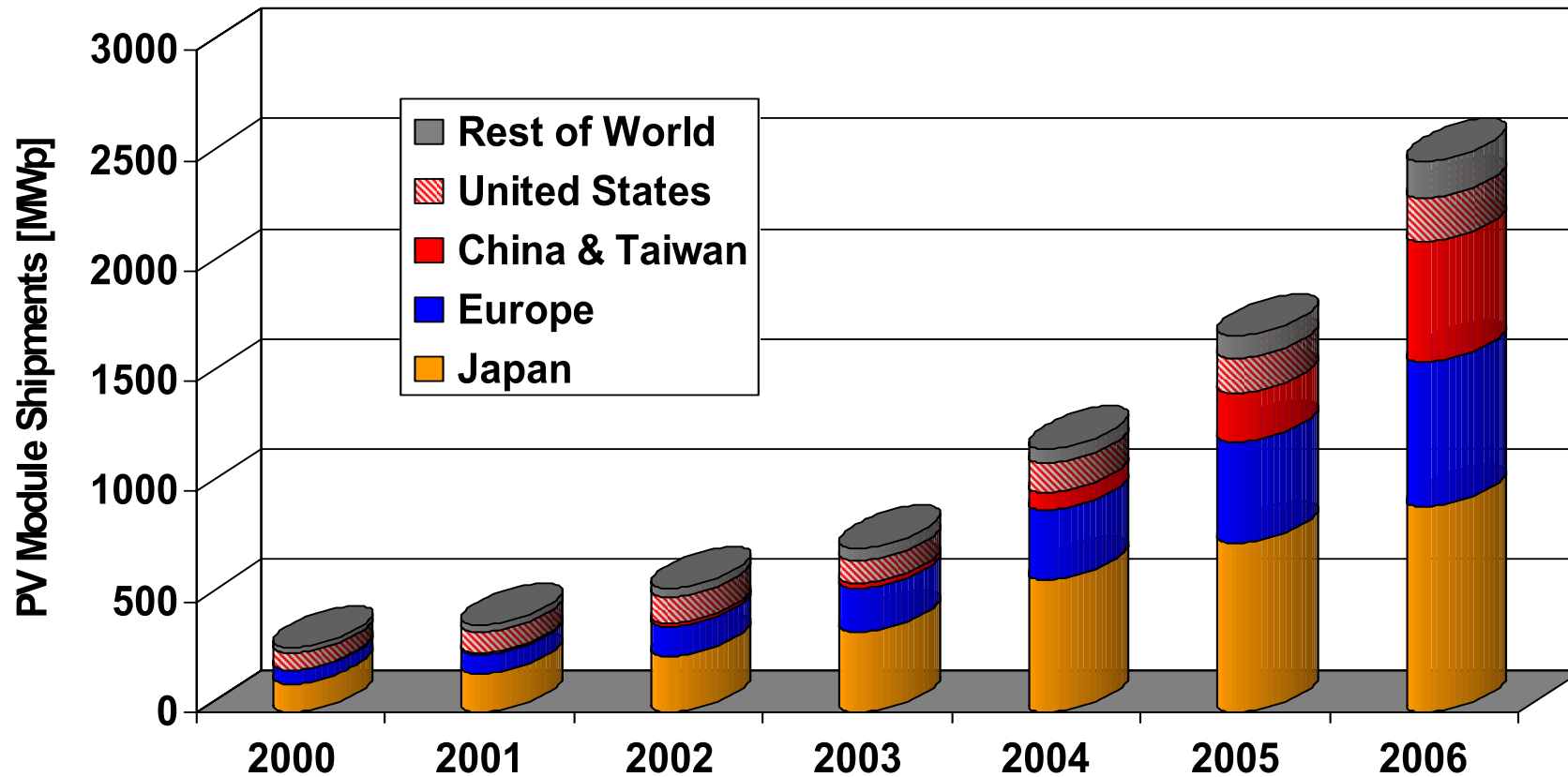
## Possible Contribution of Renewable Sources to European Electricity Supply 2020

TWh	2006	2020	Increase	Share2020 / 2006 Consumption
Wind	95	856	17%/yr	28.1%
Biomass	55	209	10%/yr	6.9%
Solar	2.5	150	34%/yr	5.0%
<b>Total</b>	<b>152.5</b>	<b>1215</b>	<b>15%/yr</b>	<b>40%</b>
Consumption	3040	2432	-1.6%/yr	-44TWh/yr
<b>newRES-E</b>	<b>4%</b>	<b>50%</b>		

## Solar Electricity

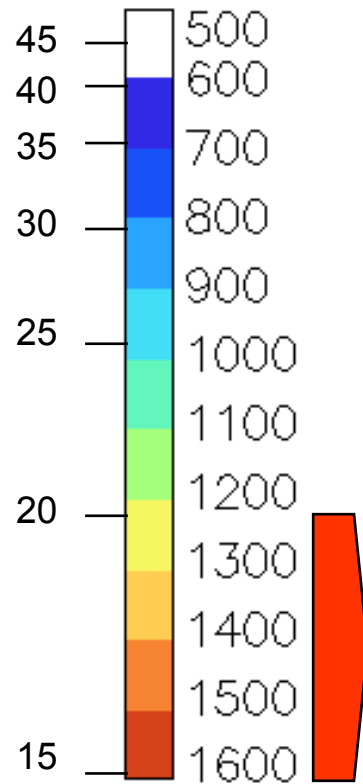
- *Do next generation Photovoltaic technologies achieve 30 years lifetime? Or more?*
- *And how do they end their life? After how much electricity produced?*
- *Does the buyer really get what he pays for?*
- ***Where is PV best located?***
- ***Does it pay back to track the sun's movement?***
- *Can we push the Technology to its Efficiency Limits (>80%)?*

## Photovoltaics: Continuous Growth 43% / year, 10 Bio€ 2006

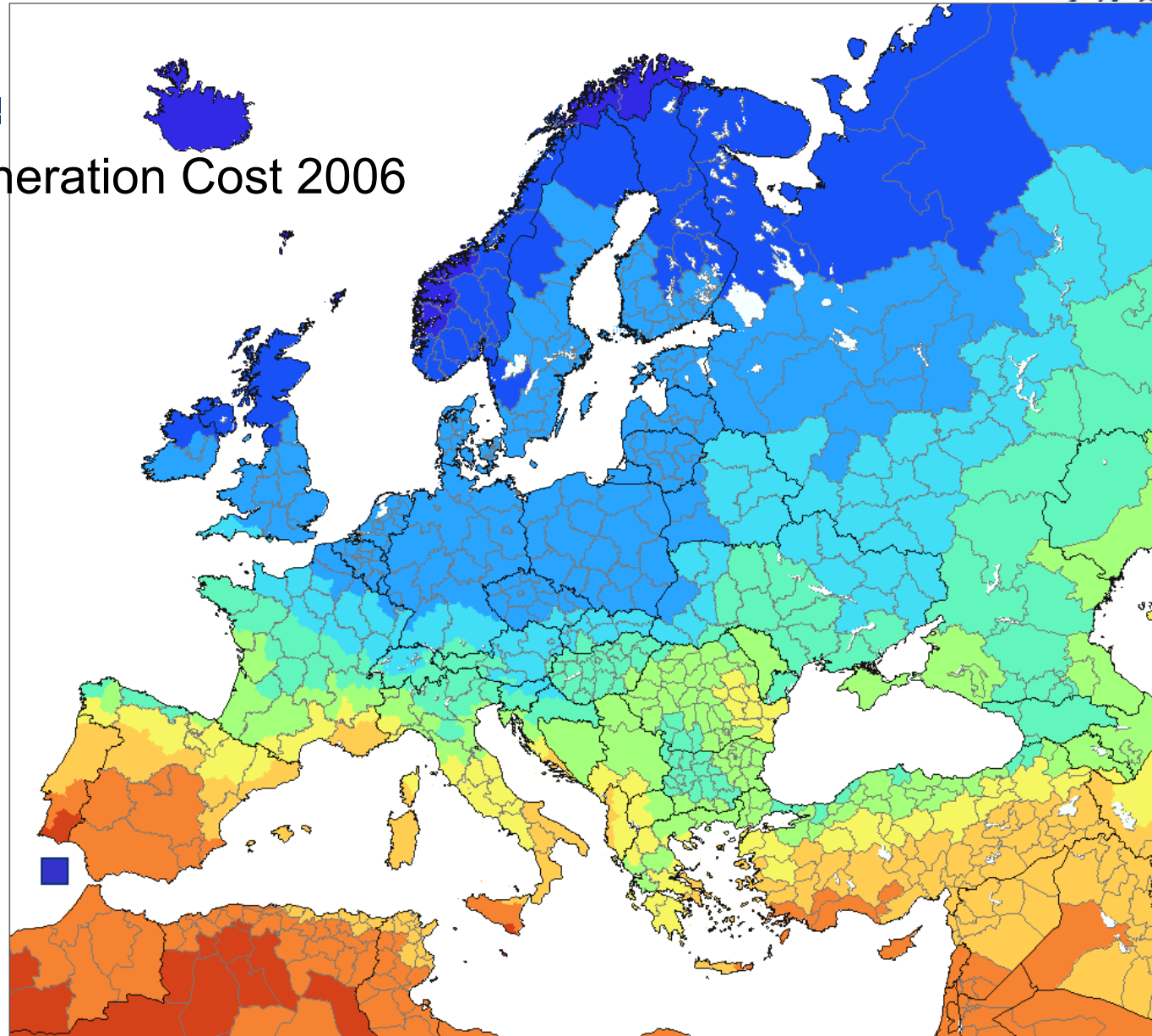


Note: 1000 MWp produces 1.2 TWh of electricity per year

## Regional PV-Generation Cost 2006



cent/kWh [kWh/kWp]

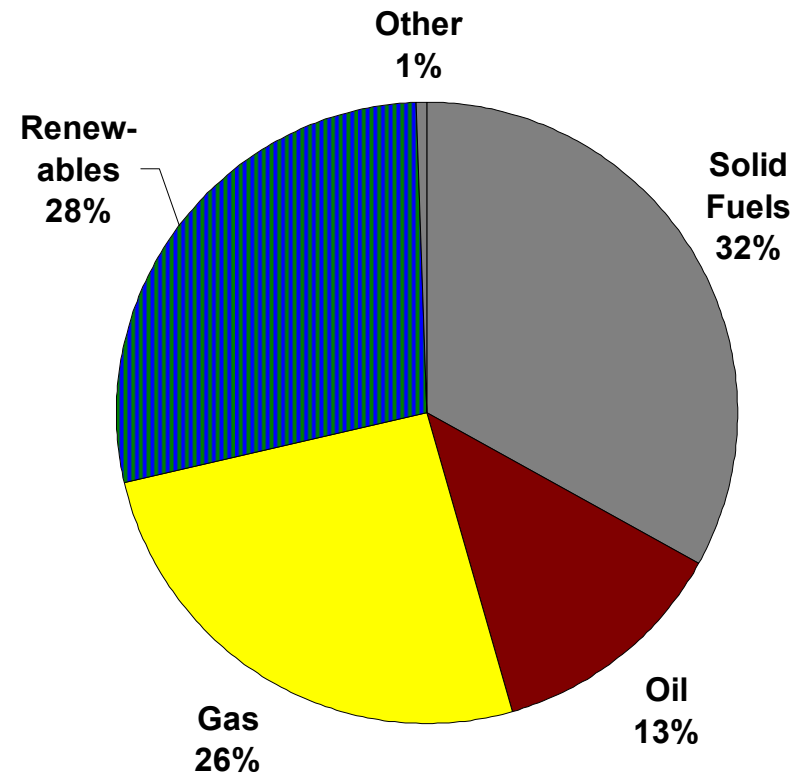


1 MW System Cost: 4 €/kWp, Interest: 2% above Inflation, optimum tilt angle, O&M 0.5% 25 yrs lifetime, PR 0.75

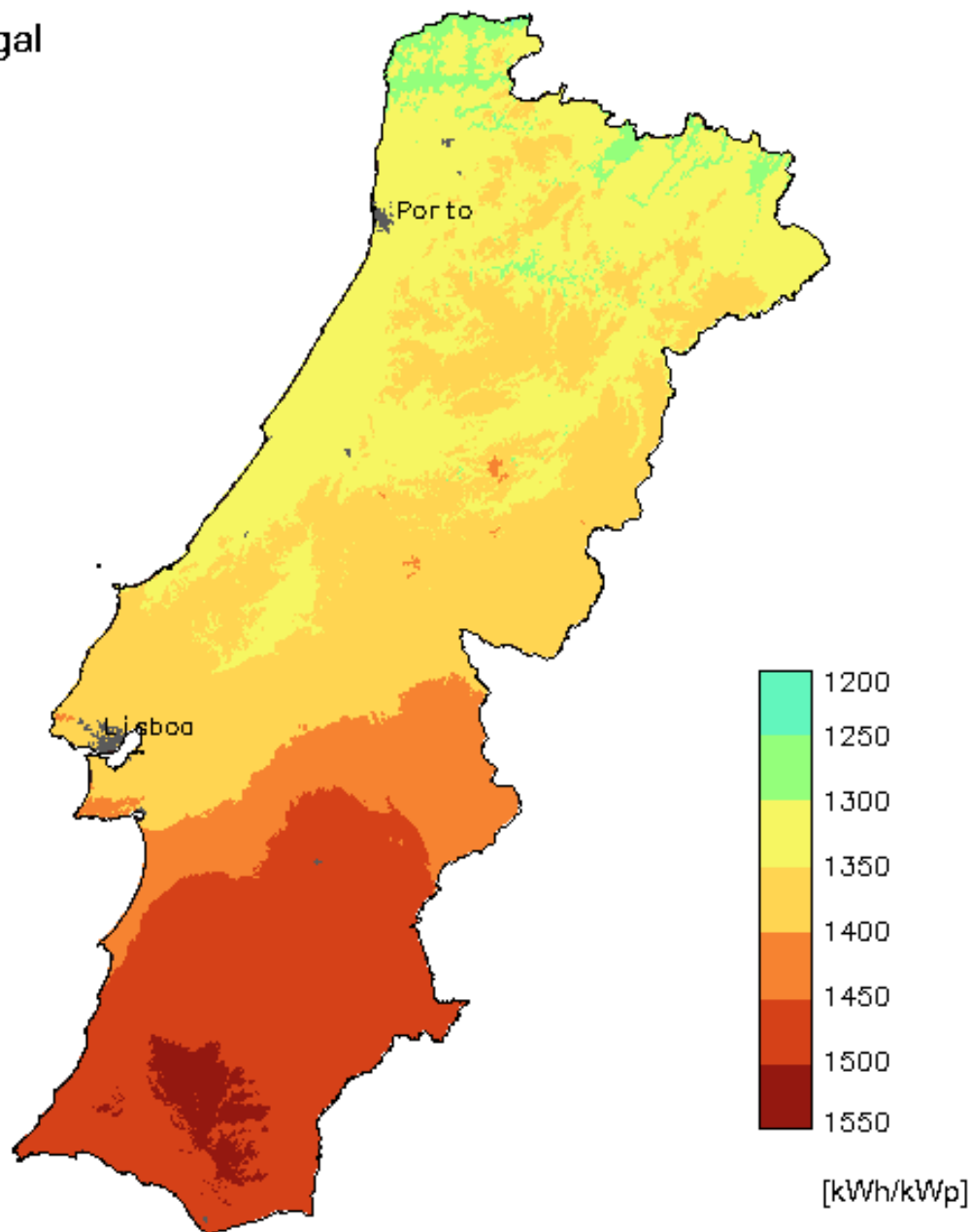
## Portugal: Key Energy Data

	PT	EU27
toe/cap	2.5	3.7
tco <sub>2</sub> /toe	2.5	2.2
tco <sub>2</sub> /cap	6.1	8.2

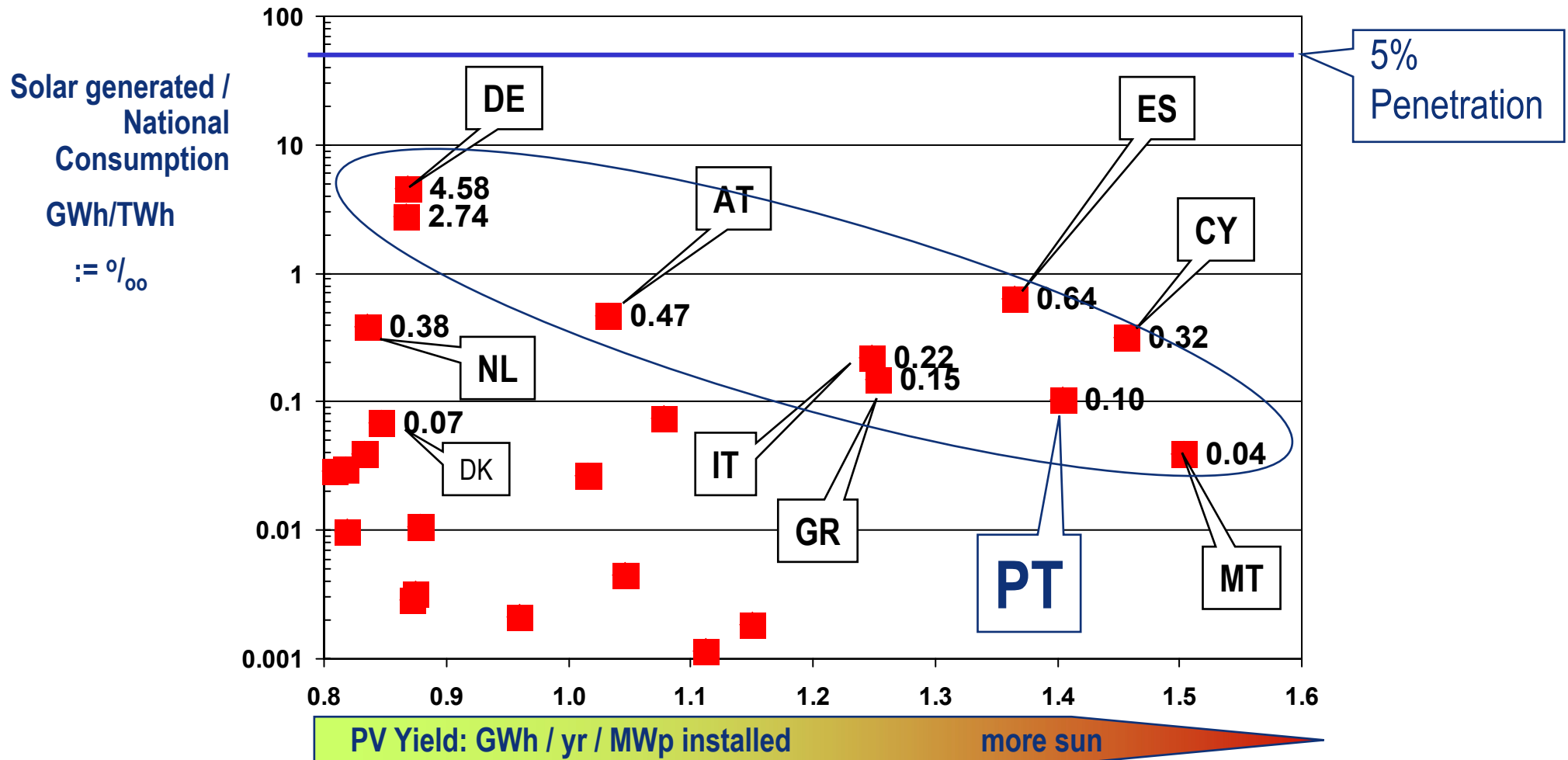
## Electricity Generation by Fuel

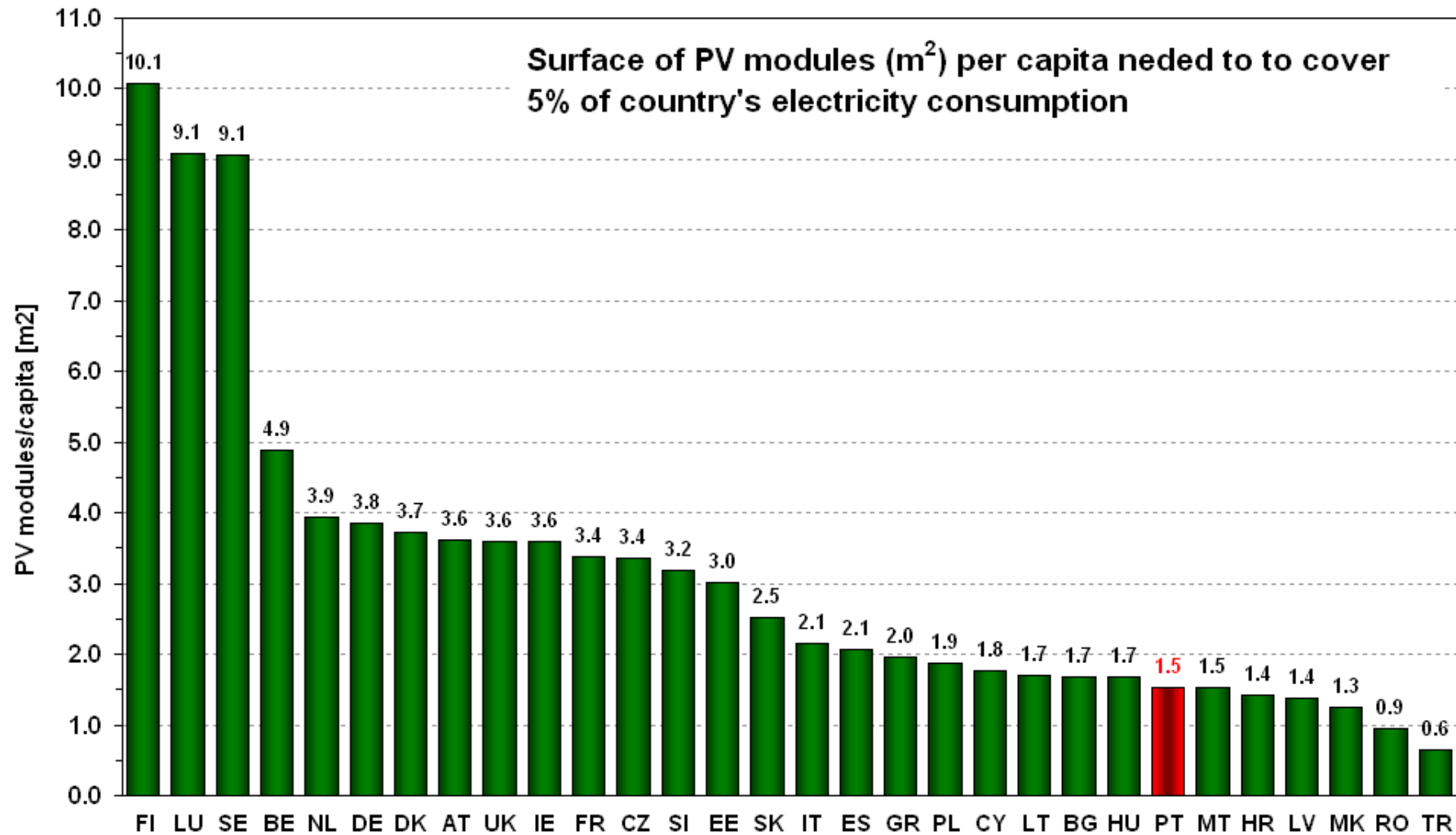


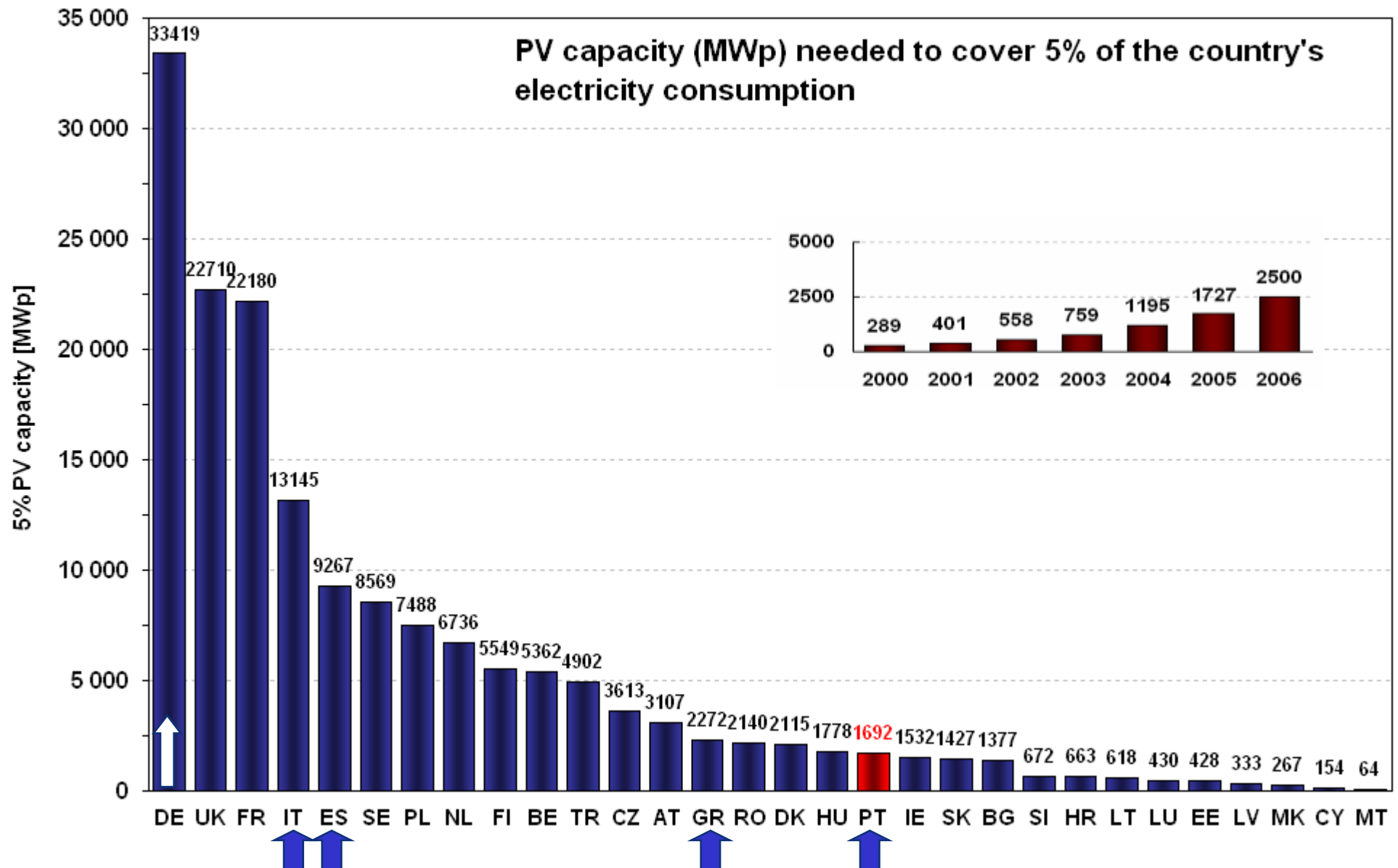
## Portugal



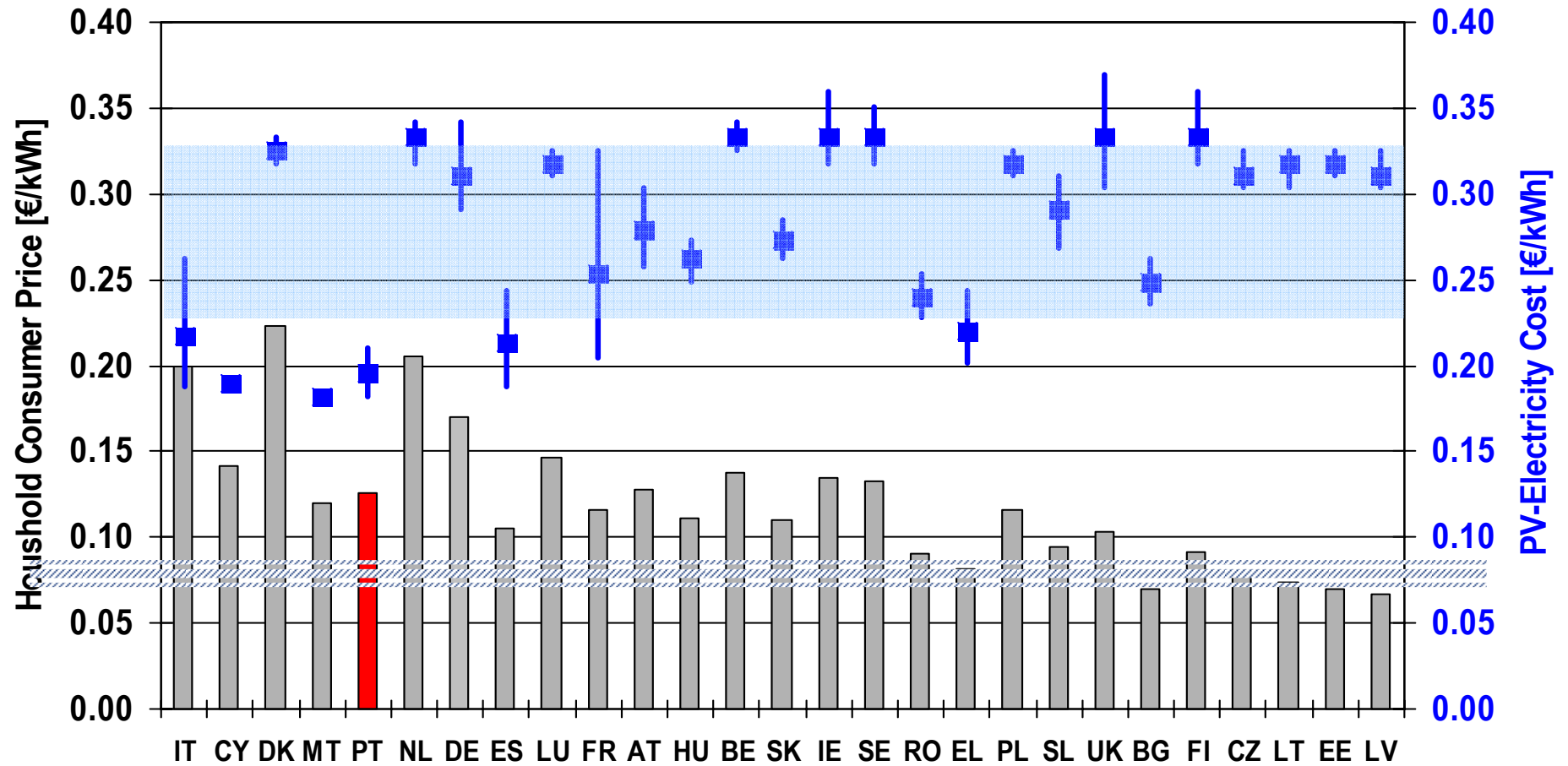
# PV Share in National Electricity Production 2006 [%<sub>00</sub>]







# Photovoltaic Electricity Costs 2006



Sort order: lowest ratio PV-cost / household price.

Parameters: **4000 €/Wp**; 4% Interest; 0.5%/yr O&M; **25 yr** operational life; source: DG-JRC PV-GIS

# Thank You !

