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Energia per un mondo che sta cambiando: le fonti di energia rinnovabili

Saint Vincent – Valle d'Aosta, IT, 21. Settembre 2007

Dott. Heinz Ossenbrink,
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- Il mondo di energia cambia
- Politica
- Nuovi Fonti Rinnovabili
  - Biocarburanti
  - Eolico
  - Fotovoltaico

La Sfida Energetica:

- **Sostenibiltà**
  - Crescita economica senza consumi di Risorse naturali ?
  - Riscaldamento globale
- **Sicurezza di Approvvigionamento**
  - Ridurre la dipendenza dalle importazioni
- **Crescita della Domanda fuori della UE**
  - 2000 milioni senza minimo di elettricità
  - forte crescita in Asia e America-Sud

Solo Due Opzioni :

Limitazione della Domanda

- Diminuire Intensità Energetica (TWh/PLN)
- Aumentare il Rendimento della Produzione di Elettricità

Aumentare le Fonti (Europee)

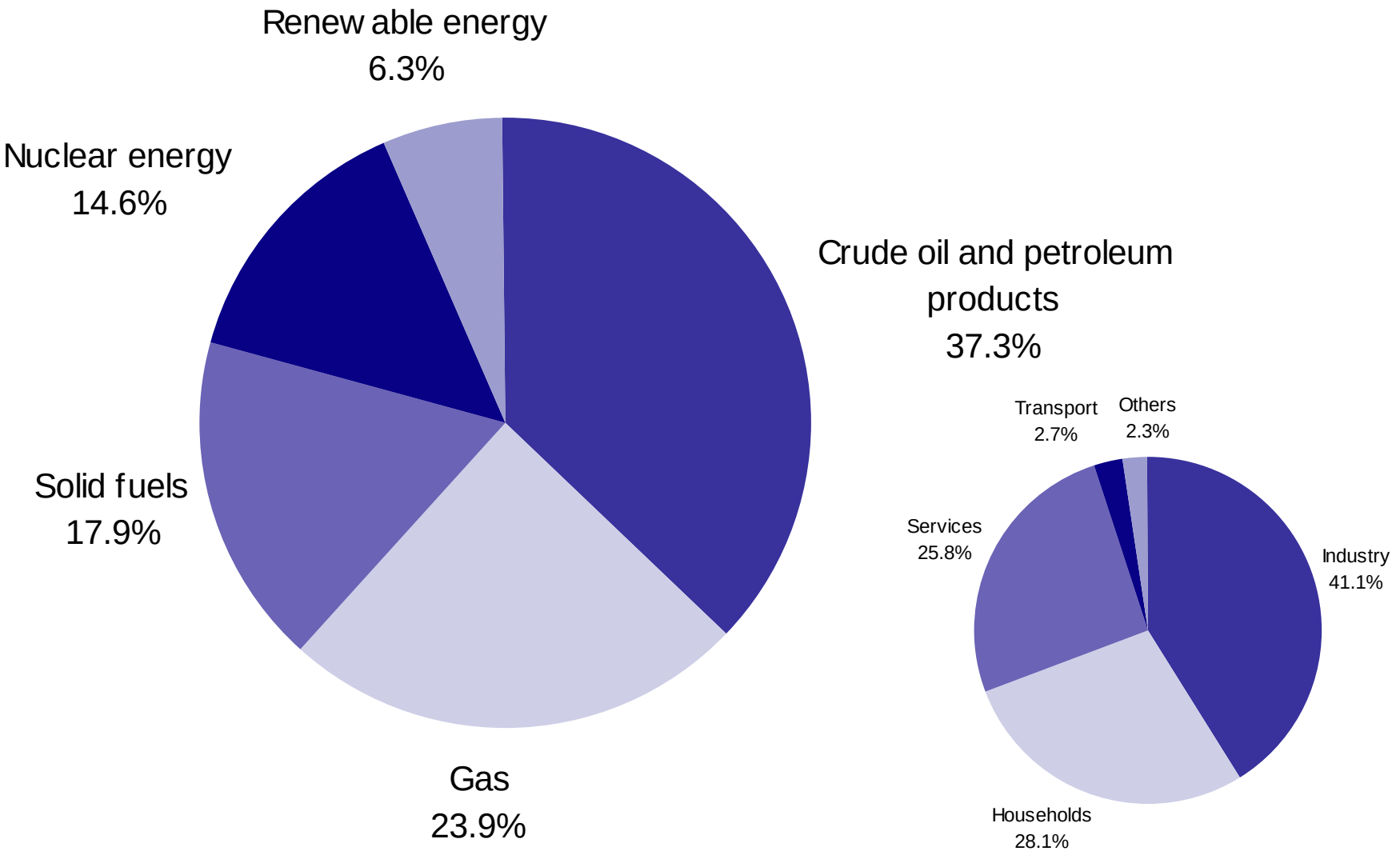
- Opzione Nucleare
- Sviluppo e implementazione delle fonti rinnovabili

Vertice UE 8/9 Marzo 2007

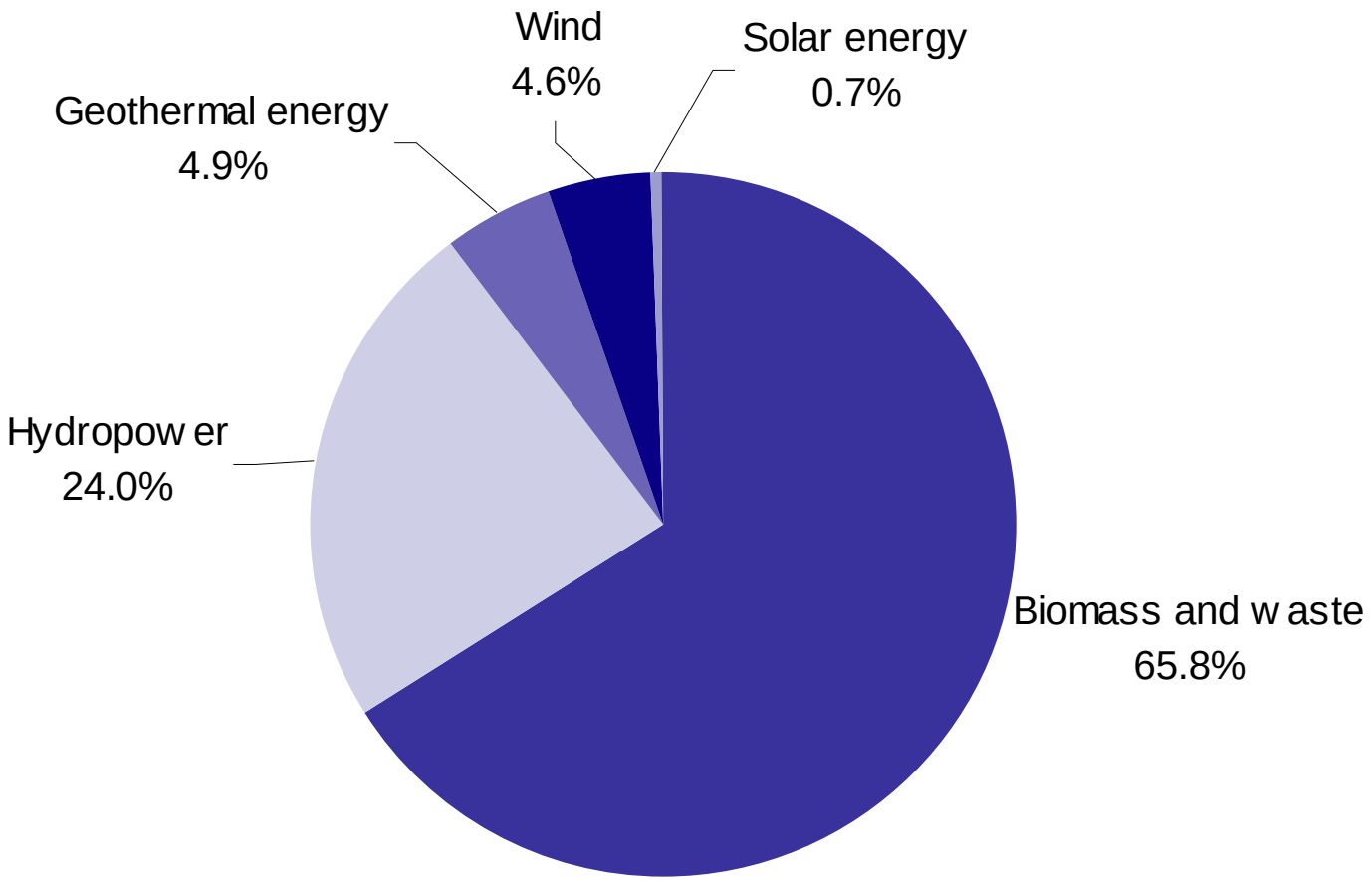
(Giornata della Donna)

- I Paesi Membri sono d'accordo, di obbligarsi a raggiungere entro 2020 seguenti obiettivi:
  - 20% meno CO_2
  - 20 % Energie Rinnovabili (2006: 6.8%)
  - 10 % Bio-carburanti (2006: 2.5%)
  - 20 % meno del Consumo Energetico

Consumo di Energia EU27 (2004)



Energia Rinnovabili, EU-25, 2004



Efficiency of Energy Technologies

Use	Techno-logies Today		Lost	Dated	Europ. Cons.	Technologies Today and Tomorrow	Cross fertilisation
Illumi-nation	Incandes-cent Lamp		96%	~1879	65 TWh	CFL and LED	Optoelectronics
Stand-By Loads	Iron Trans-former + Rectifier		80%	~1882	50 TWh	HF Switchers	Semiconductors
Car Drive Train	Com-bustion Engine		75%	~1862	280 Mtoe	Brushless DC Motors LiPolymers H2 Fuel Cells	Advanced Materials, Polymer Electrochemistry Electronics
Electricity Gene-ration	Steam Turbine		60%	~1885	218 Mtoe	Wind Photovoltaics	Aerodynamics Quantum Physics Semiconductors Thin Film Displays

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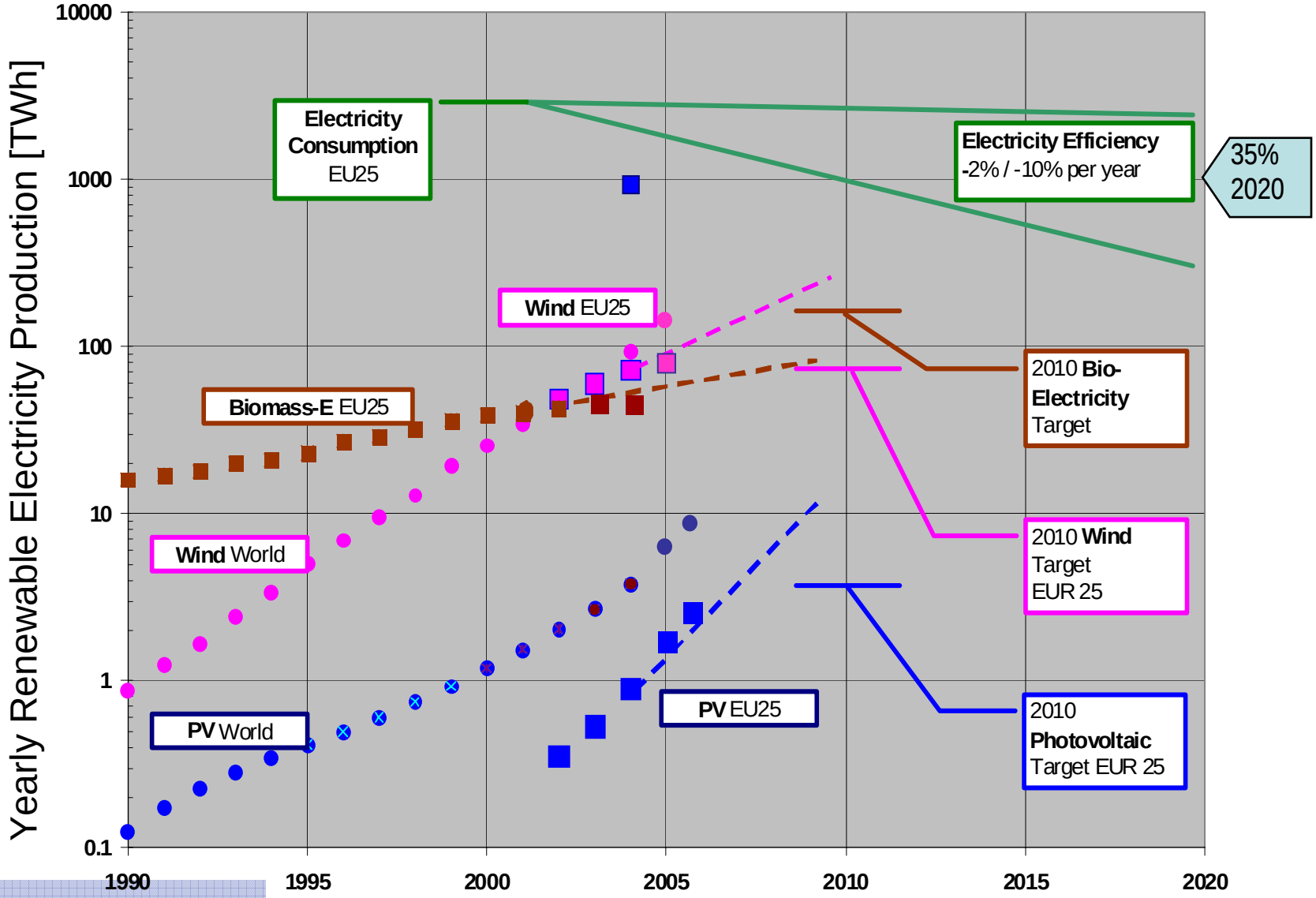
Progress of Renewable Electricity in EU25



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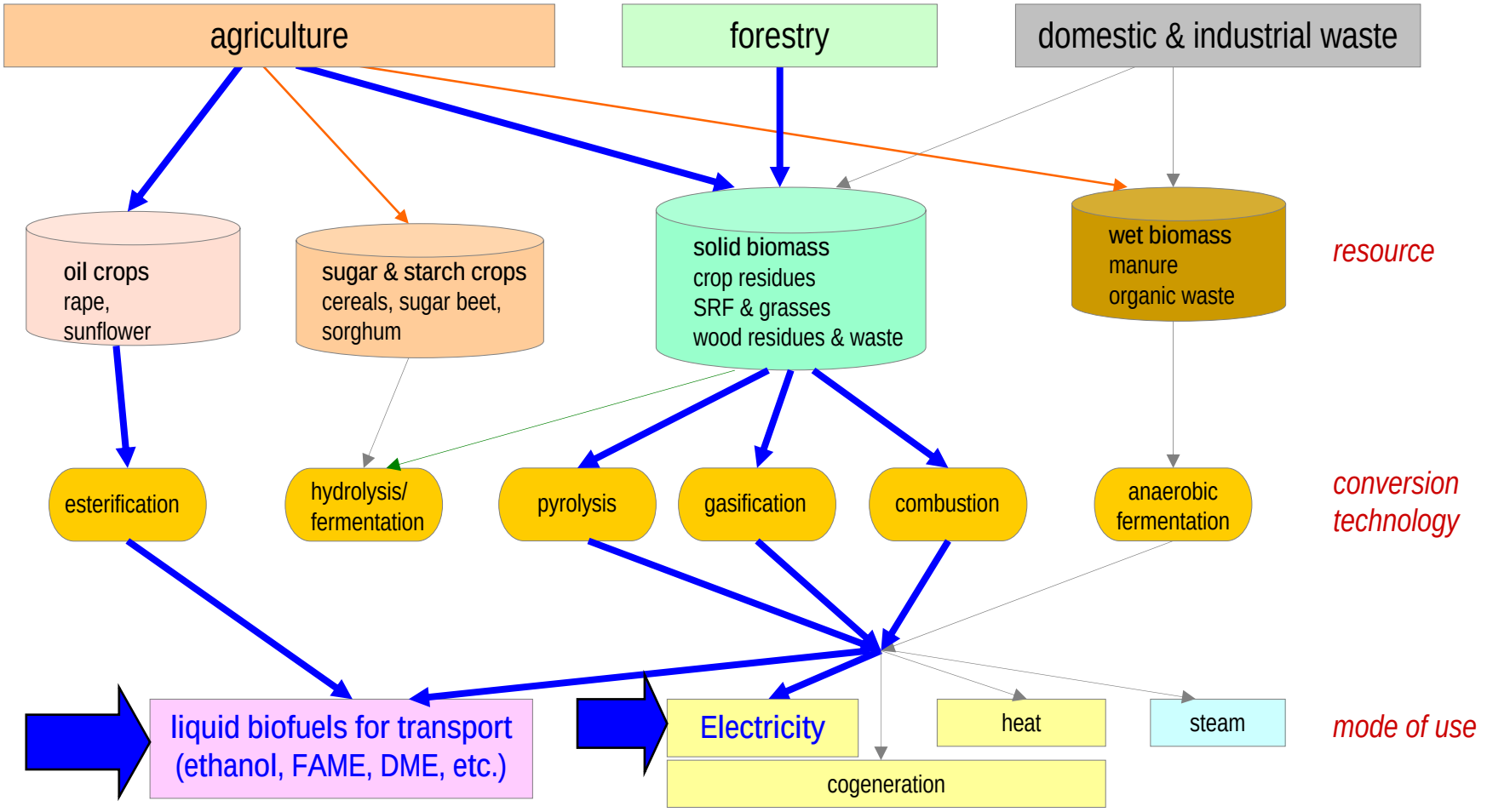
Bio- Energia

Bio-Energia



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Biocarburanti e Elettricita

Ely power station Economics/Optimisation Suitability maps Localisation

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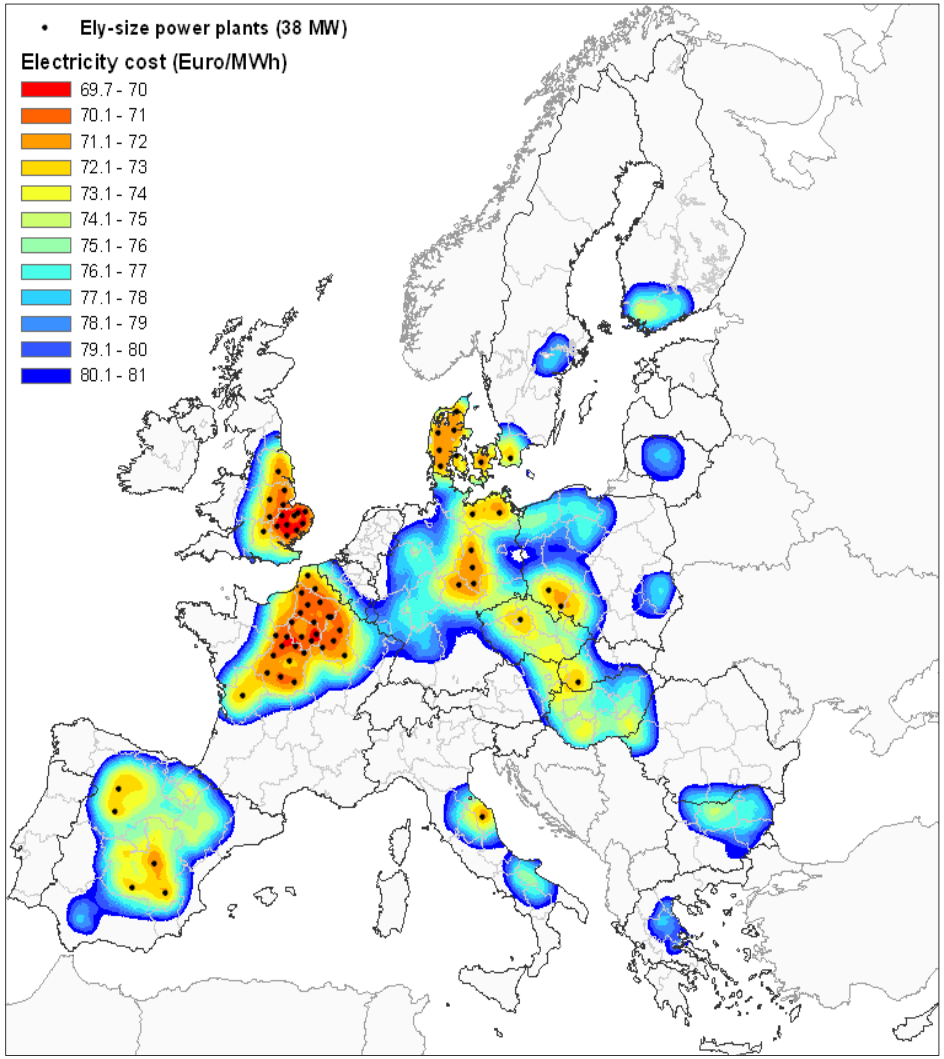
Effect of resource density on electricity cost

Steps:

straw density -> collection radius -> transport distance -> straw cost -> **electricity cost** (capacity is fixed)

Our theoretical sites have **electricity price 6.9-7.3 €cents/kWh**



Assumptions:

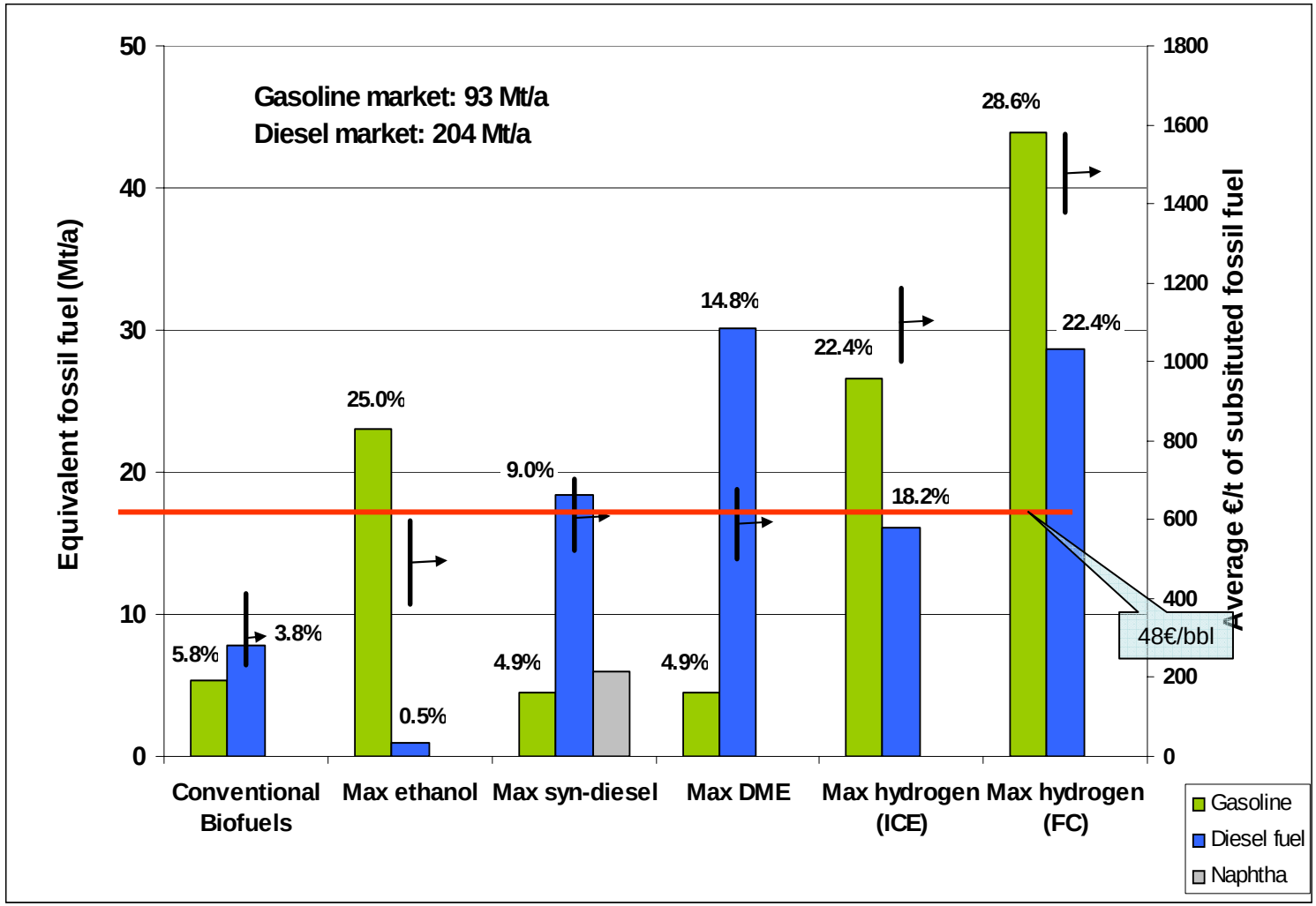
- *yearly consumption 200 000 ton + 50% reserve*
- *transport distance up to 50km*

Biocarburanti

- Attualmente l'unica soluzione rinnovabile per il trasporto (Etanolo, RME, etc..)
- Molti fonti diversi disponibili
- Resorse Europei sufficiente per 5..10%
- Nuove tecnologie in sviluppo
- Impatto ambientale: Certificazione globale
- Sprecco di natura in una tecnologia inefficiente

Se a Cina non solo 3% della populazione usano una macchina, ma 15%, tutti cittadini Europei dovranno lasciare la macchina in garage, per compensare il impatto ambientale

Bio-Carburanti: Costi delle Tecnologie Diesel / Etanolo



Columns represent how much biofuel can be produced from EU resources (left axis), limited by economics and logistics; also shown in the figure is % replacement of gasoline or diesel fuel in 2012; corresponding average cost of substituting fossil fuel is shown in the right axis. Source: Well-to-Wheel Study, IES

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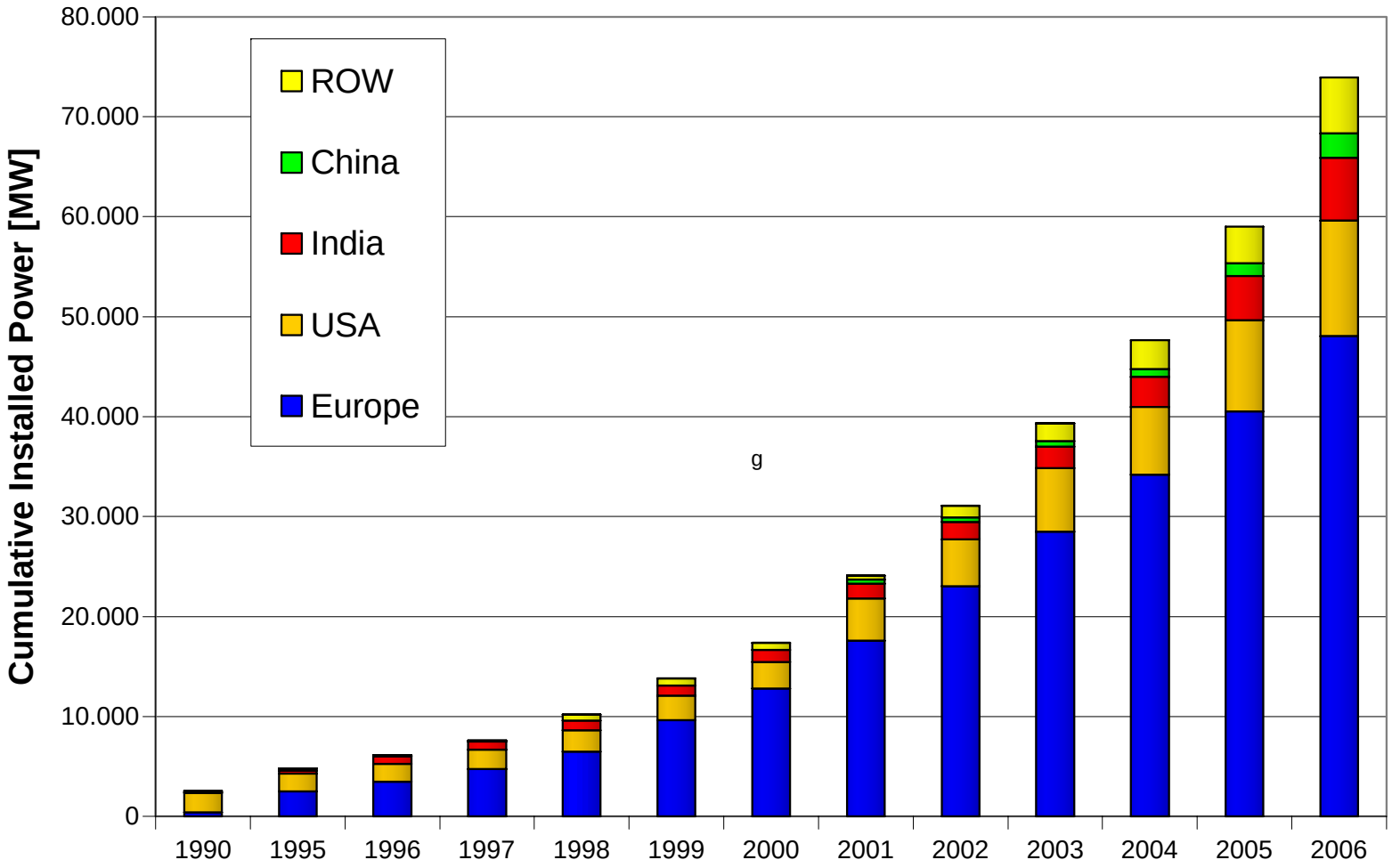
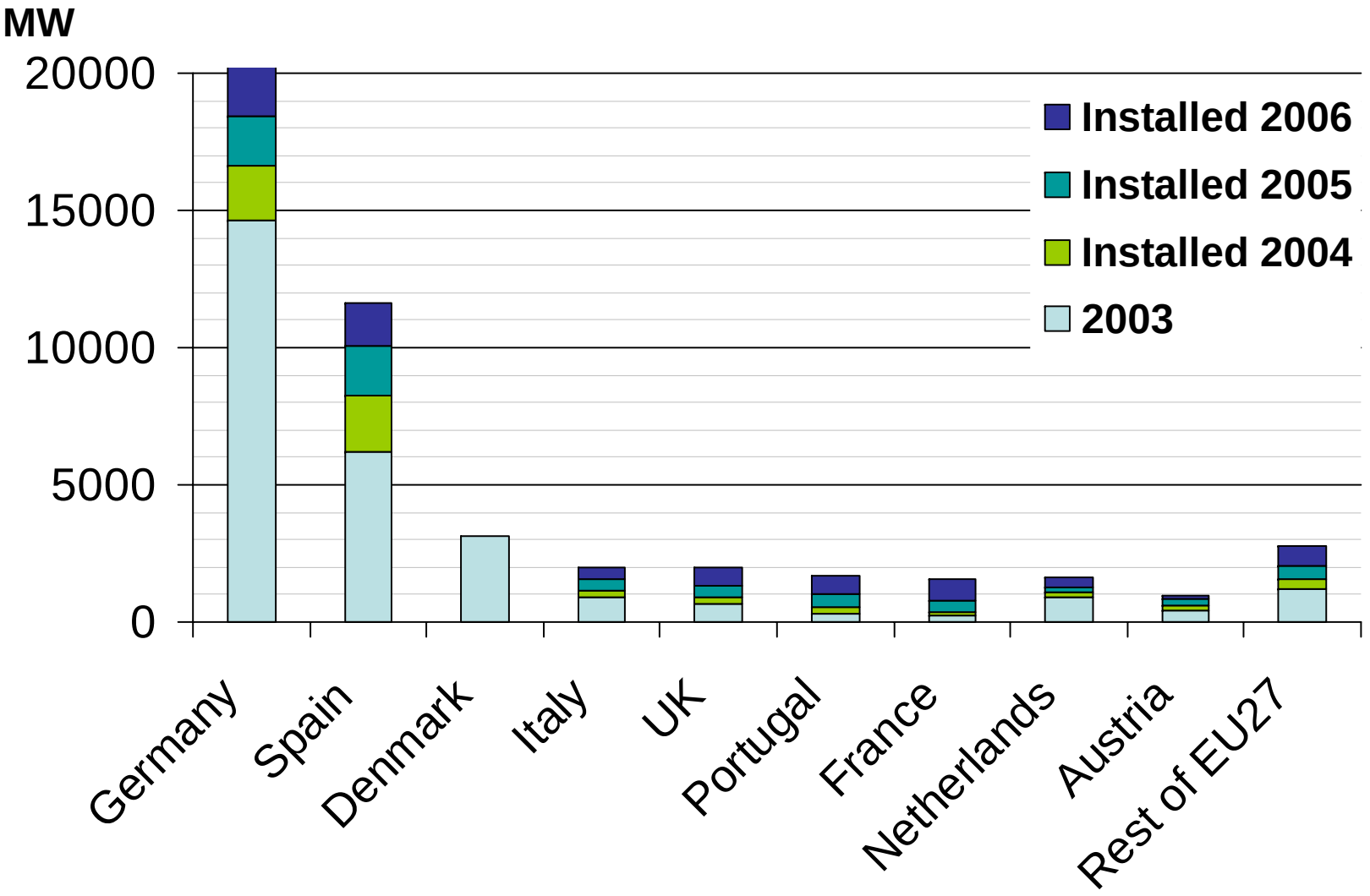
Energia Eolica

Produzione delle Generatori Eolici

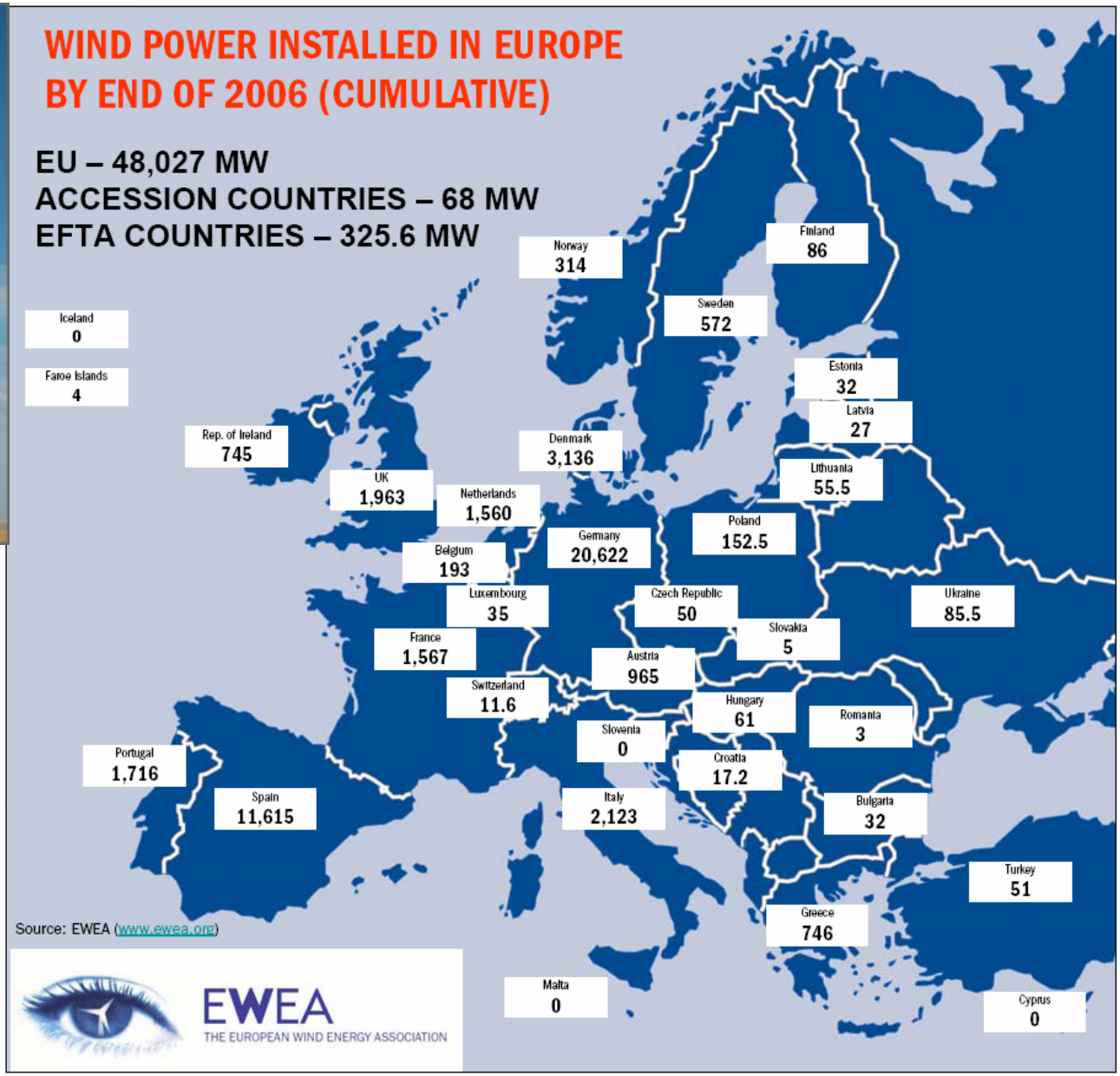


Generatori Eolici: “Top 10” della Europa



WIND POWER INSTALLED IN EUROPE BY END OF 2006 (CUMULATIVE)

EU – 48,027 MW
ACCESSION COUNTRIES – 68 MW
EFTA COUNTRIES – 325.6 MW



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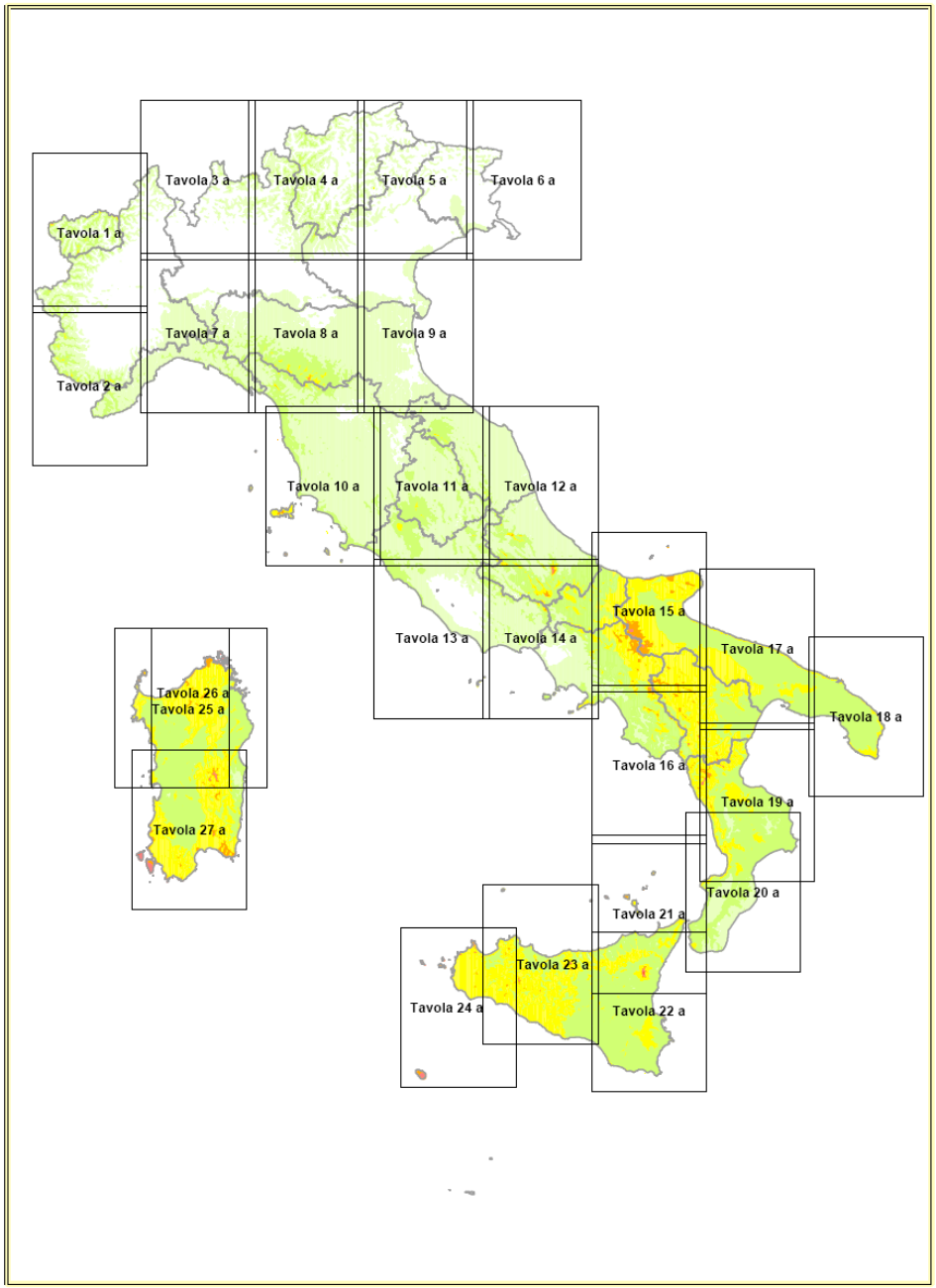
Energia Eolica

- Italia ha resorse limitate

Mappa complessiva e quadro d'unione delle tavole di velocità media annua del vento a 25 m s.l.t.



Mappa elaborata da CESI in collaborazione con il Dipartimento di Fisica dell'Università di Genova nell'ambito della Ricerca di Sistema.
Per una corretta interpretazione si veda il testo dell'Atlante di cui questa mappa fa parte.

m/s
3 4 5 6 7 8 9 10 11

0 250 500 km

Scala 1:6.000.000

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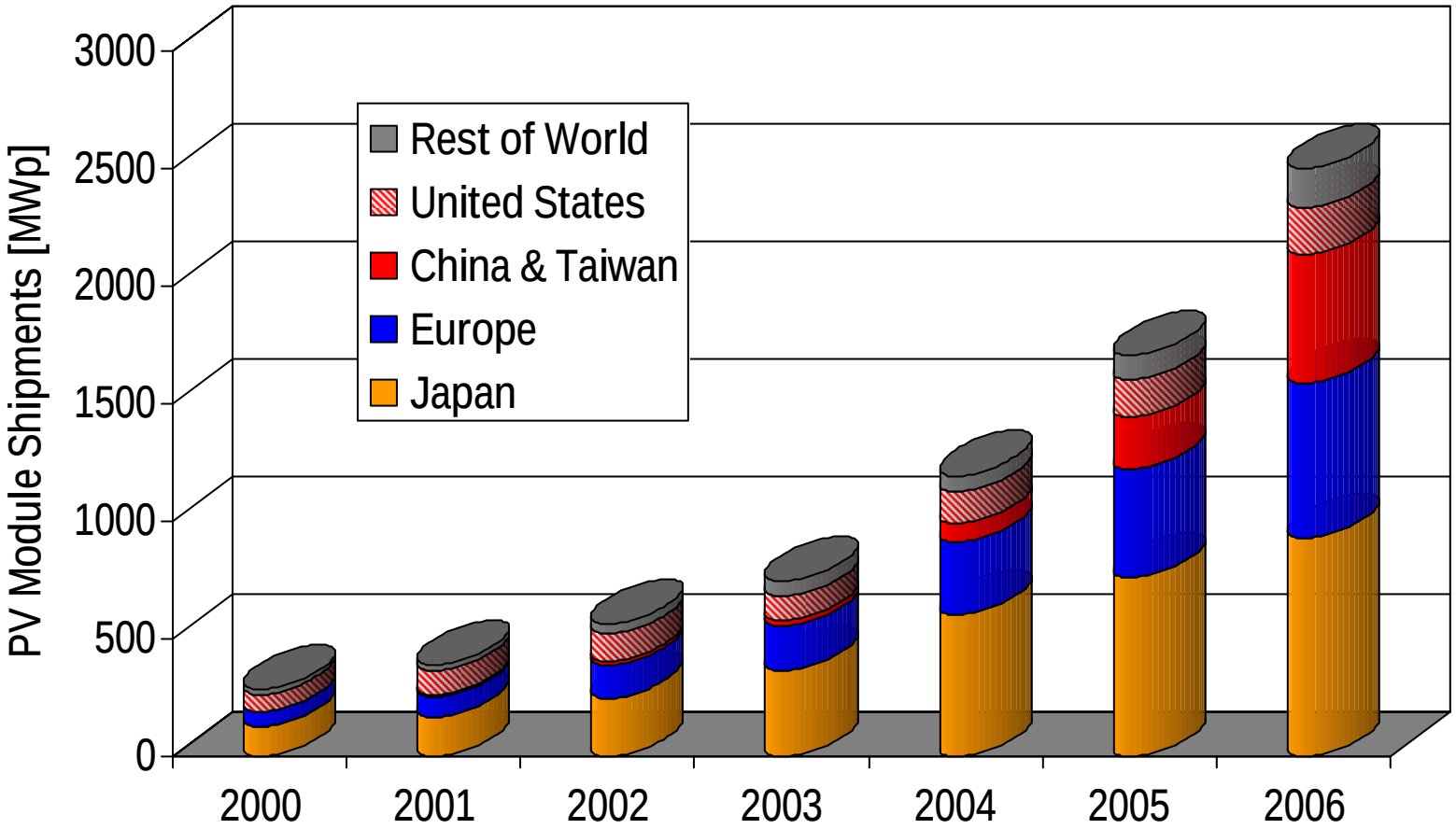
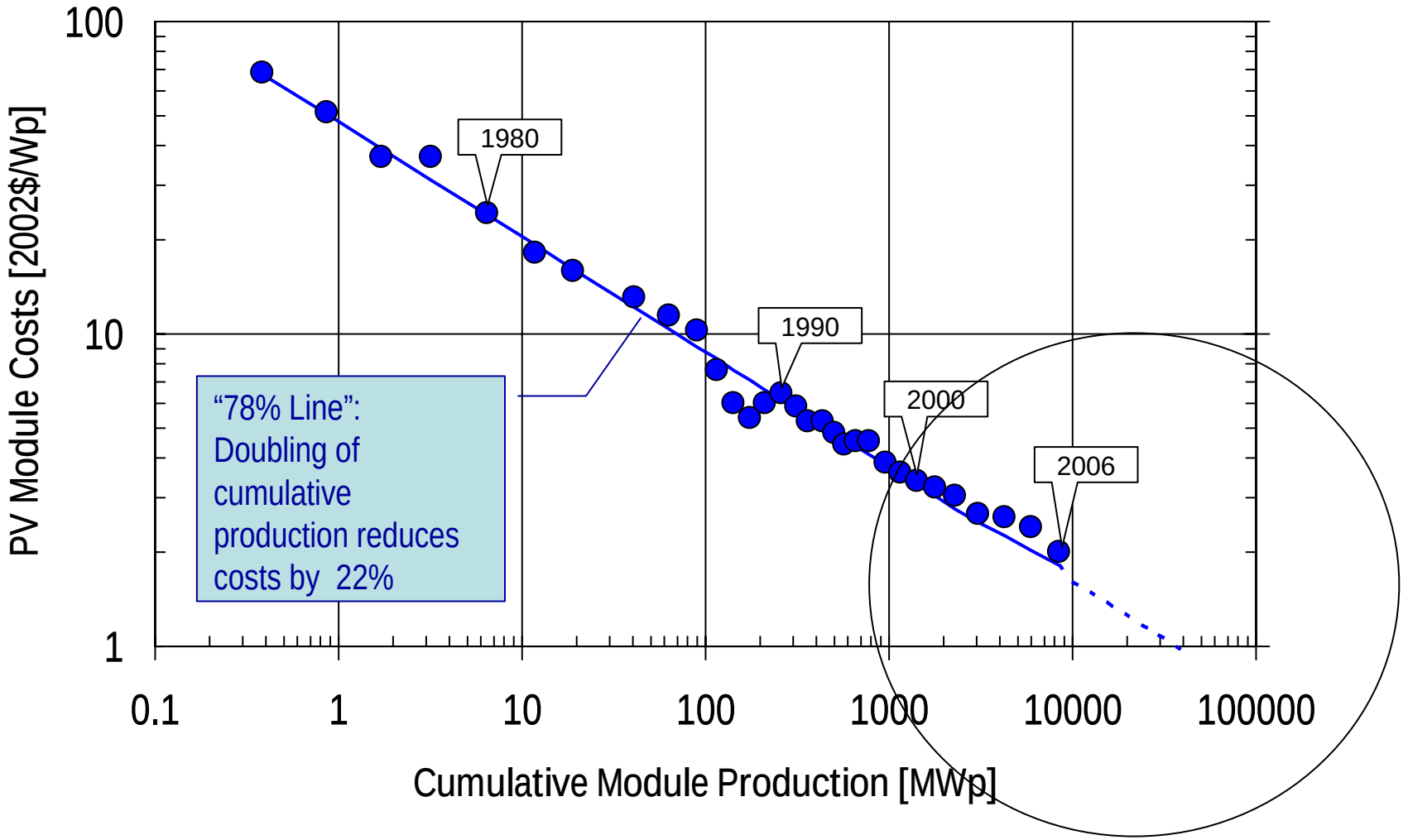
Fotovoltaico

FV: cresce sempre 43% / anno



Note: 1000 MWp produces 1.2 TWh of electricity per year

Fotovoltaico: „Learning Curve" da `76



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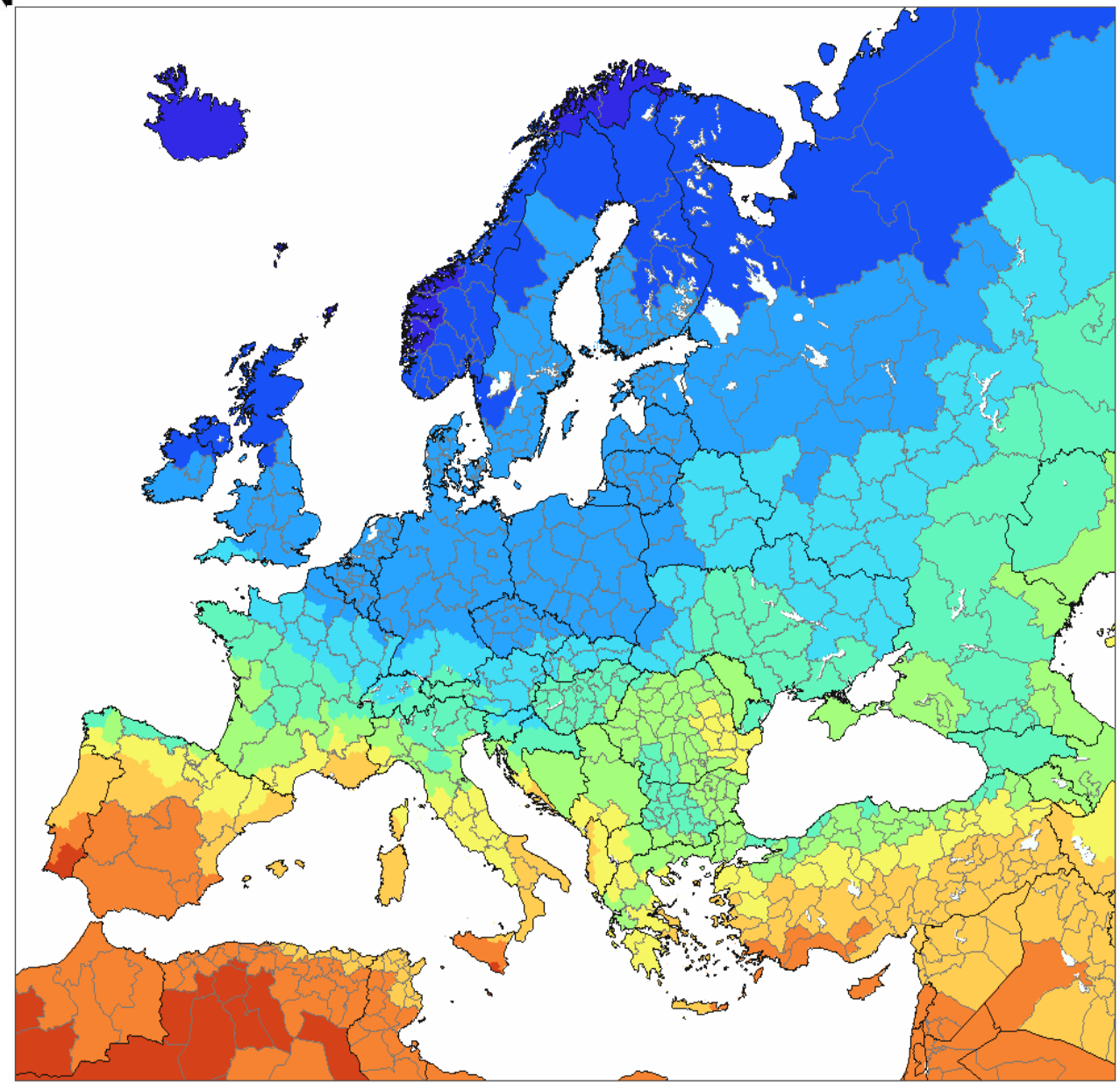

1 MW System Cost: 4 €/kWp, Interest: 2% above Inflation, optimum tilt angle, 20 yrs lifetime, PR 0.75

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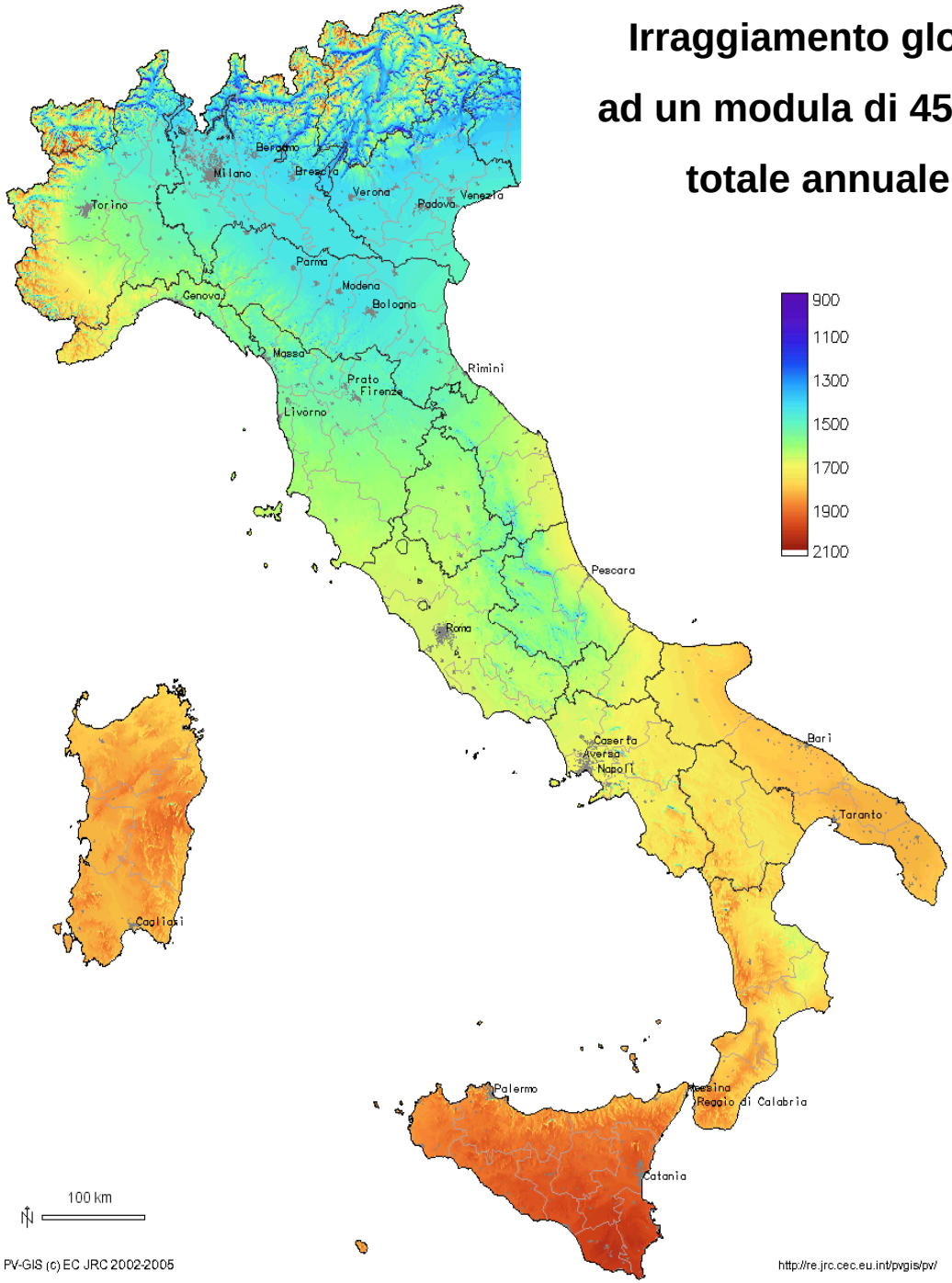
Irraggiamento globale *arrivando*
ad un modula di 45º di inclinazione,
totale annuale in [kwh/m²]



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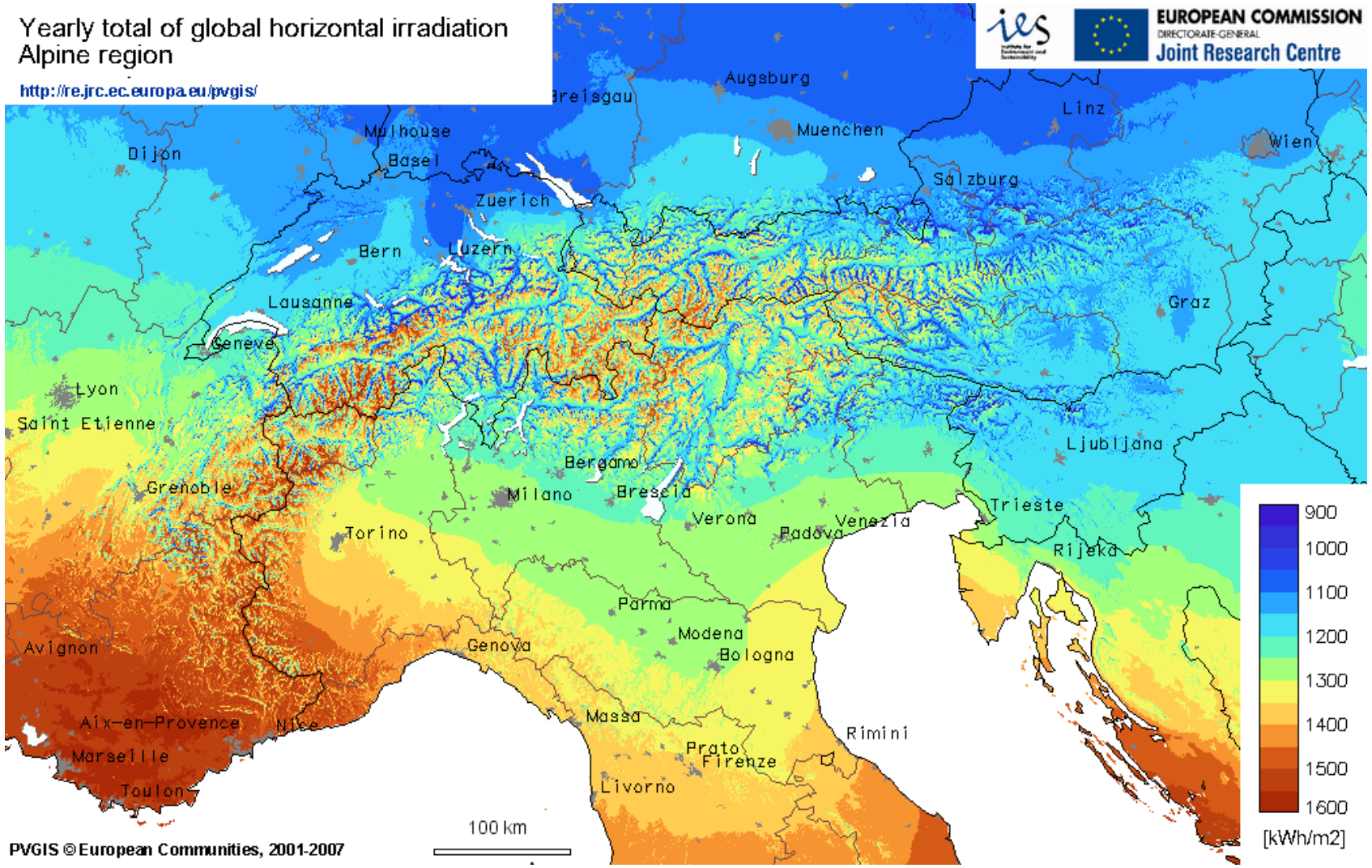
Irraggiamento Solare Regioni Alpi



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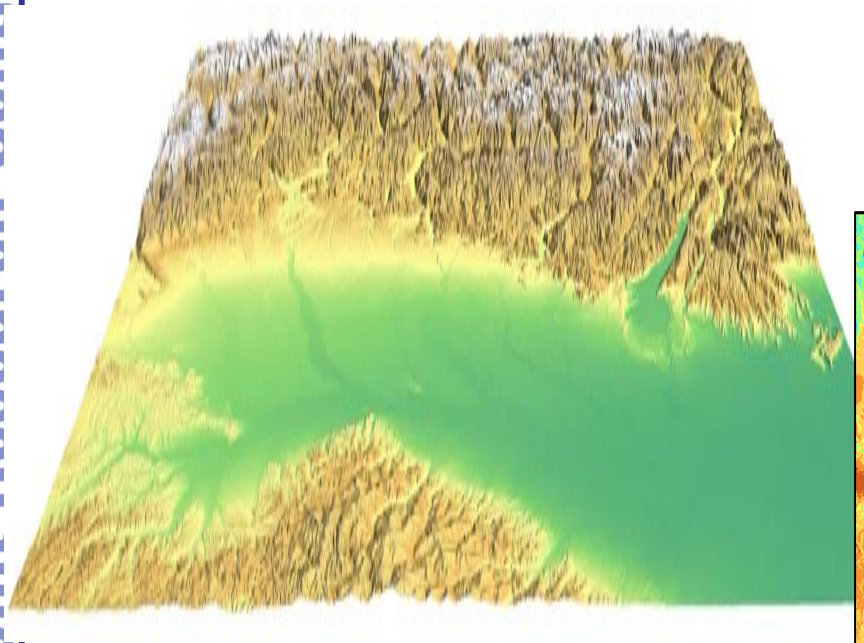
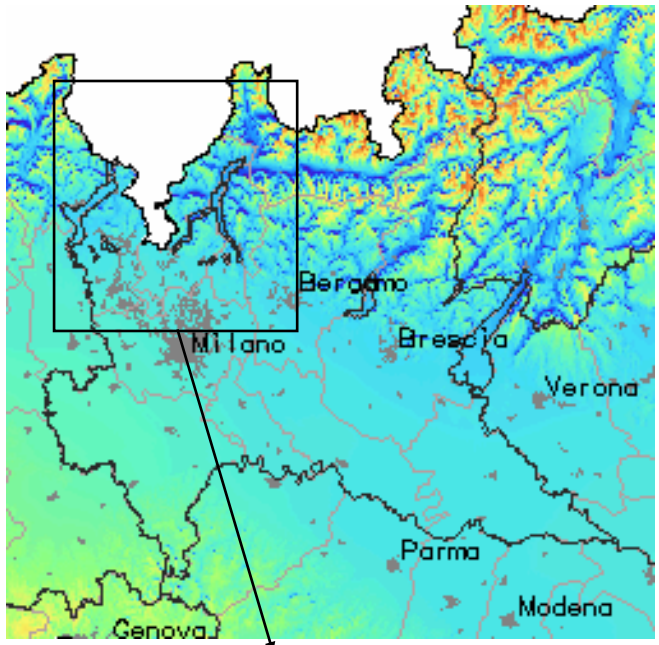
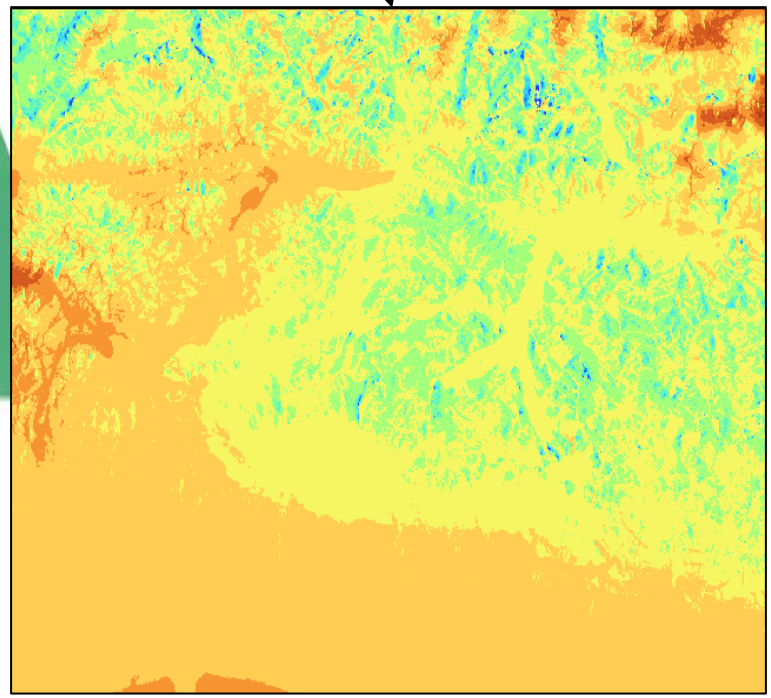
Risoluzione di

100 m x 100 m







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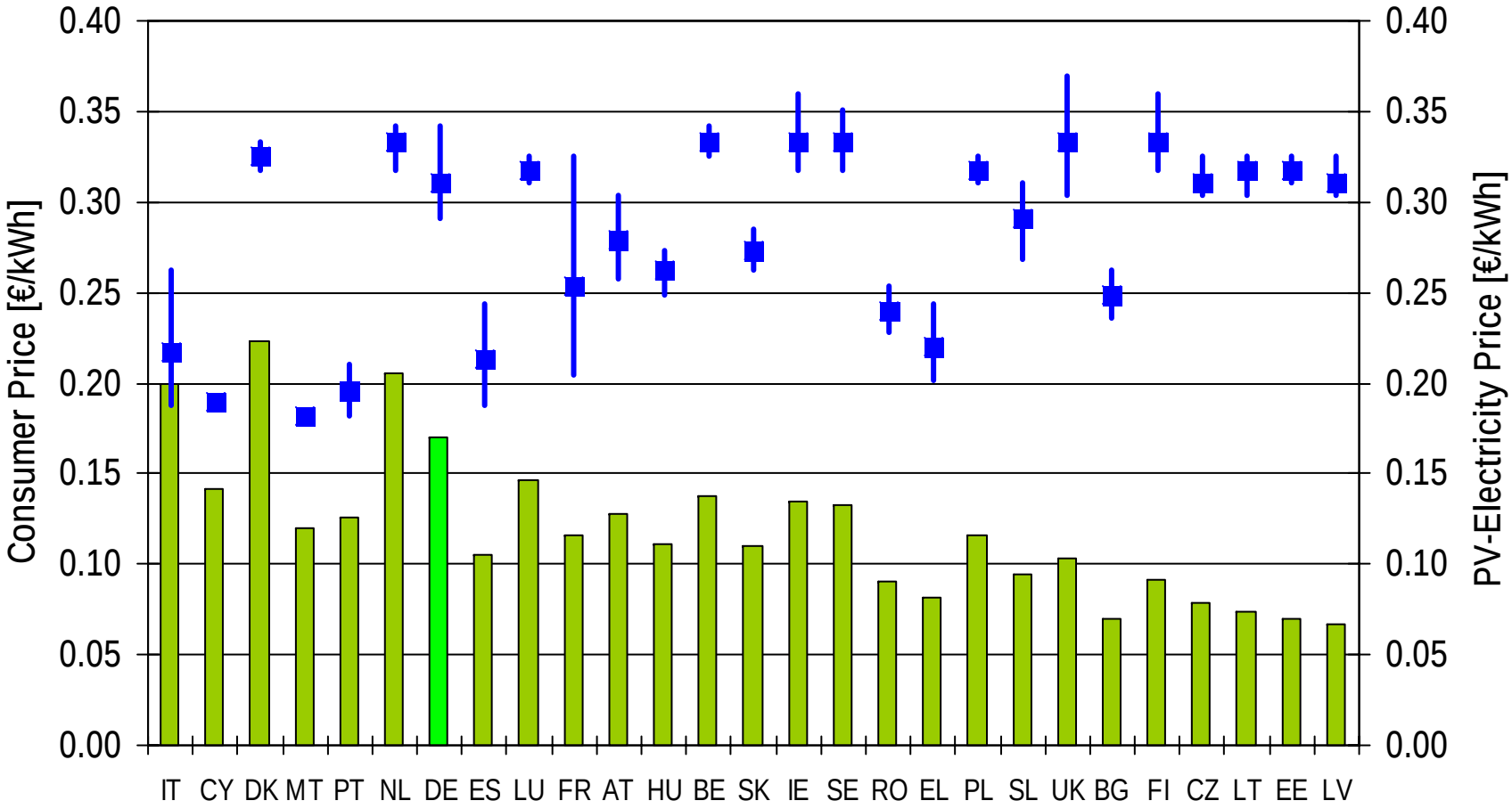
Prezzo Elettricita Fotovoltaica 2006



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

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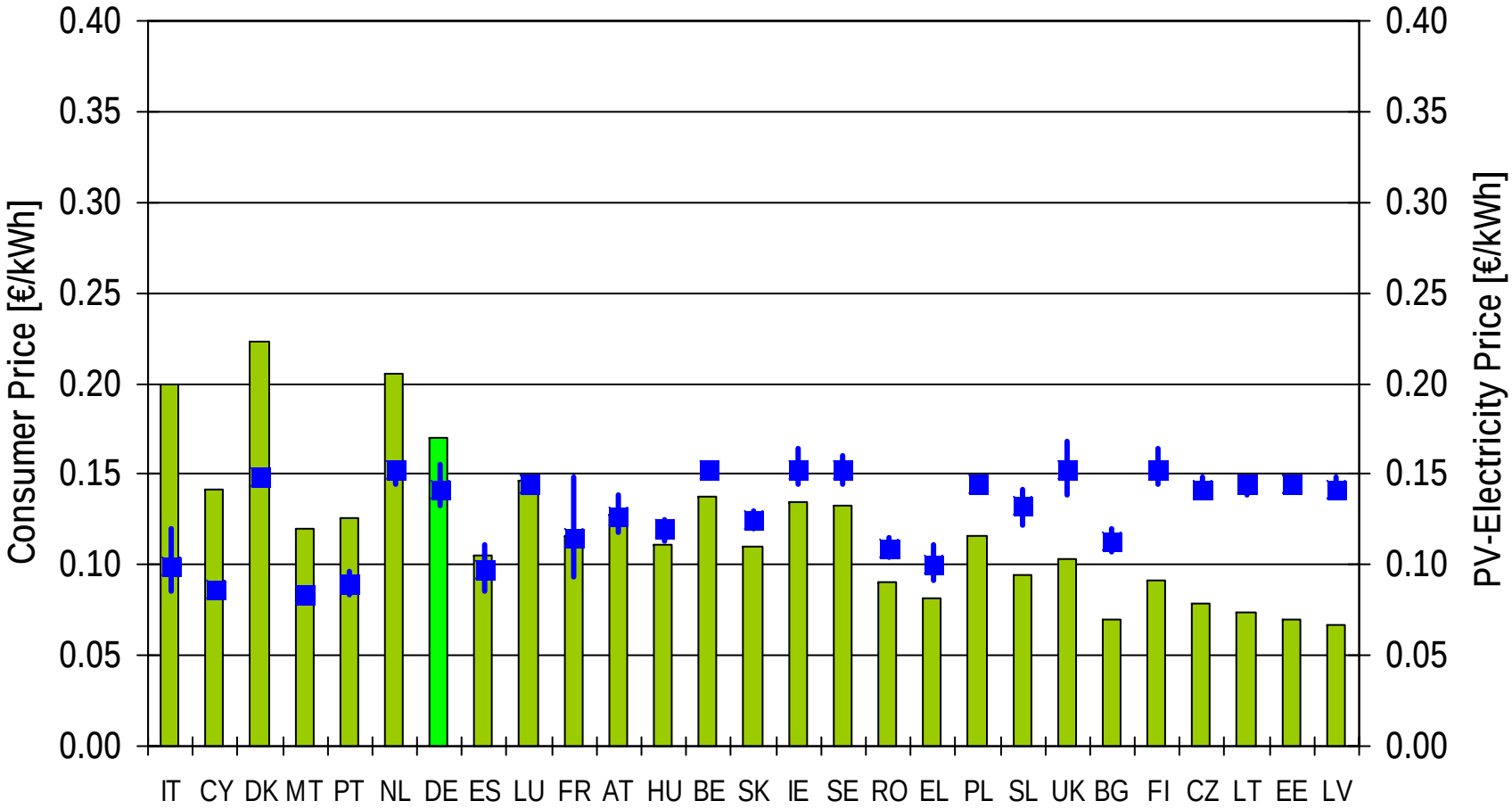
Prezzo Elettricita Fotovoltaica fra 7 anni



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

Parameters: 2000 €/Wp; 4% Interest; 0.5%/yr O&M; 30 yr operational life; Source: DG-JRC PV-GIS

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Electricity prices compared to solar radiation in Sardinia

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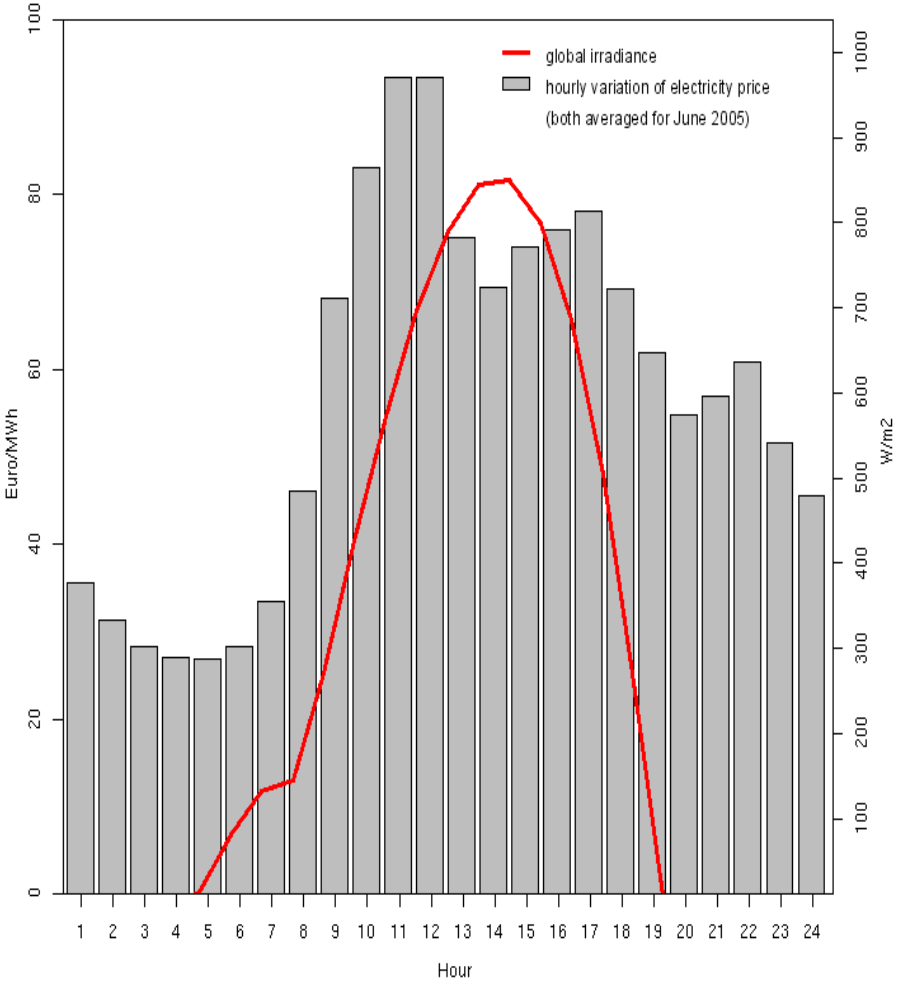

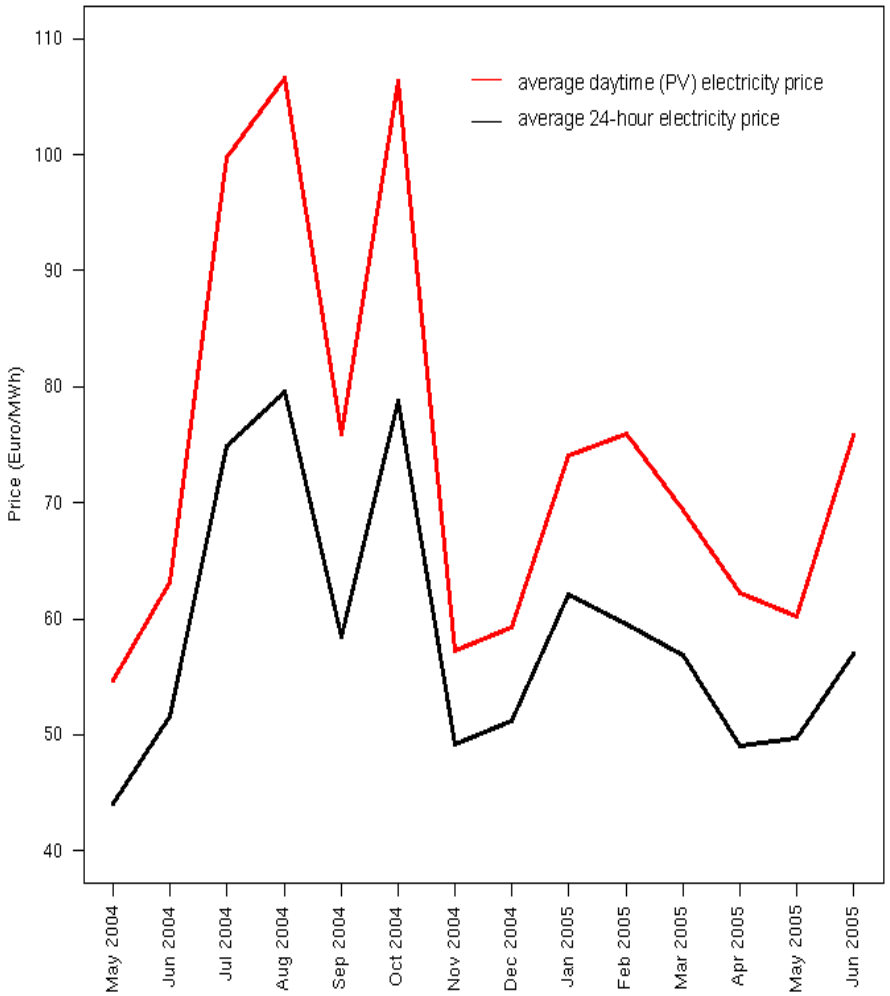

Daily variation of the market price compared with global irradiance (both averaged for June 2005)

* the average price of daytime electricity (produced by a PV system)
* average 24-hour electricity price

Source: *Šúri M., Dunlop E., Huld T., Ossenbrink H. (2005). Geographical aspects of solar electricity generation in Europe. In: Dunlop E., Wald L., Šúri M. (eds.) Solar Resource from the Local Level to Global Scale in Support of the Management of Renewable Electricity Generation,ova Science Publishers (monograph in press)*

Scenario di Fonti Rinnovabili per la Elettricita

TWh Units	2006	2020	**Incremento annuale**	Share 2020, with Electricity Savings
Eolico	95	856	**17%/yr**	35.2%
Bio-Energia	55	209	**10%/yr**	8.6%
Solare	2.5	150	**34%/yr**	6.2%
Total Rinnovabili	**152.5**	**1215**	**15%/yr**	
Consumo	3040	2432	**- 44TWh/yr**	
newRES-E	**4%**	**50%**		

Nostre Risorse naturali non abbiamo ereditato dai nostri genitori.....

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...invece le stiamo prendendo in prestito dai nostri bambini

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Grazie !