

# Energy Demand in Portugal

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Il contenuto di questa presentazione è parte integrante del corso di Fisica dell'energia dell'Università Tecnica di Lisbona, IST Portogallo. Il reggente della cattedra è il Prof. Gianfranco Sorasio, A.D del Centro Ricerche ISCAT s.r.l.

Novembre 2006, Gianfranco Sorasio :: Panorama energia in Portogallo

# Outlook

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- Energy in Europe
  - Energy demand
  - Producers
- Who produces oil, gas and coal
- Portugal
  - Energy dependance
  - Energy density
  - Import / export
  - A Fatura Energetica Portuguesa.

**ENERGY :: EUROPE**

# Europe :: Energy Demand



eurostat

***news release***

126/2006 - 21 September 2006

Energy in the EU: first estimates 2005

**EU25 energy consumption equivalent to more than three and a half tonnes of oil per capita**

EU25 energy dependence rate was 56%

# Energy Demand :: Europe 25

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**The total amount of energy required to meet the demand of the EU25 in 2005 remained stable compared to 2004, at **1637 million** tonnes of oil equivalent (toe).**

However, EU25 production of all sources of energy fell by 4.2% in 2005, resulting in an increase in net imports of 4.5%.

As a consequence, **the first estimate for 2005 shows that the EU25 depended on imports for 56% of its energy needs**, up from 54% in 2004.

Seen over a longer time period, between 1995 and 2004 energy consumption in the EU25 rose by 11%, production fell by 2%, and net imports rose by 29%. In 1995 the energy dependence rate stood at 44%.

*These figures are published by Eurostat, the Statistical Office of the European Communities.*

# Europe 25 :: Lucky Countries

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The **United Kingdom** accounted for **70% of the crude oil** produced in the EU25, followed by **Denmark (15%)**.

Production fell in both Member States in 2005, by 11.4% and 3.8% respectively.

The **United Kingdom** was also the **EU25's largest gas producer, accounting for 44% of total** production, followed by **the Netherlands (32%)**. Natural gas production in both Member States fell, by 7.7% and 5.9% respectively.

In **Poland**, which **produced 57% of the coal mined in the EU25**, production fell by 2.1%. In **Germany (19% of the EU25 total)** and the **United Kingdom (13%)**, the second and third largest coal producers, production decreased by 3.9% and 17.9% respectively.

In **France**, which **produced 46% of all the nuclear energy** in the EU25, production increased by 0.9%, but in **Germany**, which at **16%** was the second most important producer, it fell by 3.0%.

**Who produces oil, gas and  
coal ?**

# Producers of crude oil

Producers	Mt	% of World total
Saudi Arabia	519	13.2
Russia	470	12.0
United States	307	7.8
Islamic Rep. of Iran	205	5.2
Mexico	188	4.8
People's Rep. of China	183	4.7
Venezuela	162	4.1
Canada	143	3.6
Norway	139	3.5
Nigeria	133	3.4
Rest of the World	1 474	37.7
<b>World</b>	<b>3 923</b>	<b>100.0</b>

2005 data

Exporters	Mt
Saudi Arabia	346
Russia	258
Norway	132
Nigeria	123
Islamic Rep. of Iran	122
Mexico	105
United Arab Emirates	95
Venezuela	94
Canada	87
Iraq	75
Rest of the World	716
<b>World</b>	<b>2 153</b>

2004 data

Importers	Mt
United States	577
Japan	206
People's Rep. of China	123
Korea	114
Germany	110
India	96
Italy	93
France	85
United Kingdom	63
Netherlands	60
Rest of the World	708
<b>World</b>	<b>2 235</b>

2004 data

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2004 data

**7,91 toe/capita**

**25,8%**

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2004 data

# Producers of gas

Producers	Mm <sup>3</sup>	% of World total
Russia	627 446	21.8
United States	516 614	18.0
Canada	187 164	6.5
Algeria	92 797	3.2
United Kingdom	92 045	3.2
Norway	89 559	3.1
Islamic Rep. of Iran	83 535	2.9
Netherlands	78 804	2.7
Indonesia	77 305	2.7
Saudi Arabia	69 500	2.4
Rest of the World	957 004	33.3
<b>World</b>	<b>2 871 773</b>	<b>100.0</b>

2005 data

Exporters	Mm <sup>3</sup>
Russia	203 727
Canada	106 353
Norway	82 801
Algeria	68 638
Netherlands	52 355
Turkmenistan	49 423
Indonesia	36 146
Malaysia	32 614
Qatar	27 992
United States	22 288
Rest of the World	165 646
<b>World</b>	<b>847 983</b>

2005 data

Importers	Mm <sup>3</sup>
United States	121 348
Germany	90 700
Japan	80 915
Italy	73 460
Ukraine	62 132
France	46 975
Spain	33 118
Korea	29 494
Turkey	26 572
Netherlands	23 025
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2005 data

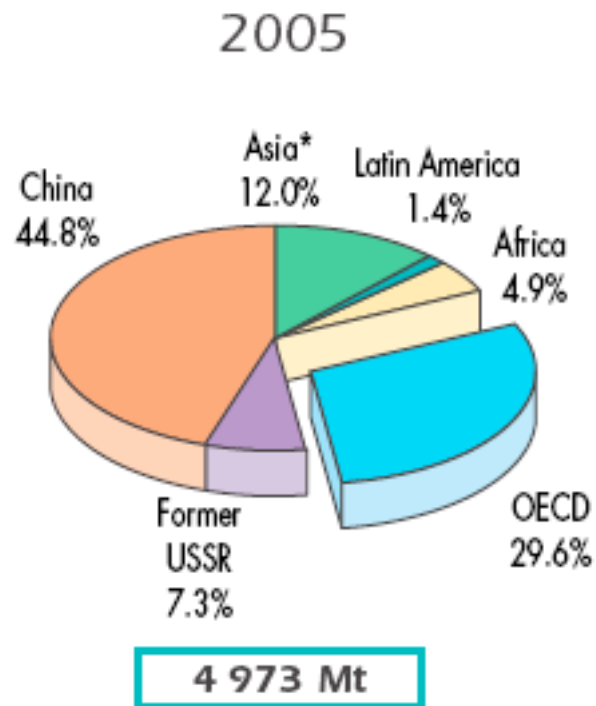
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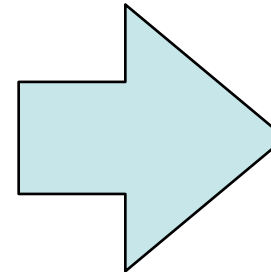
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2005 data

# Hard Coal Production



China  
44.8%

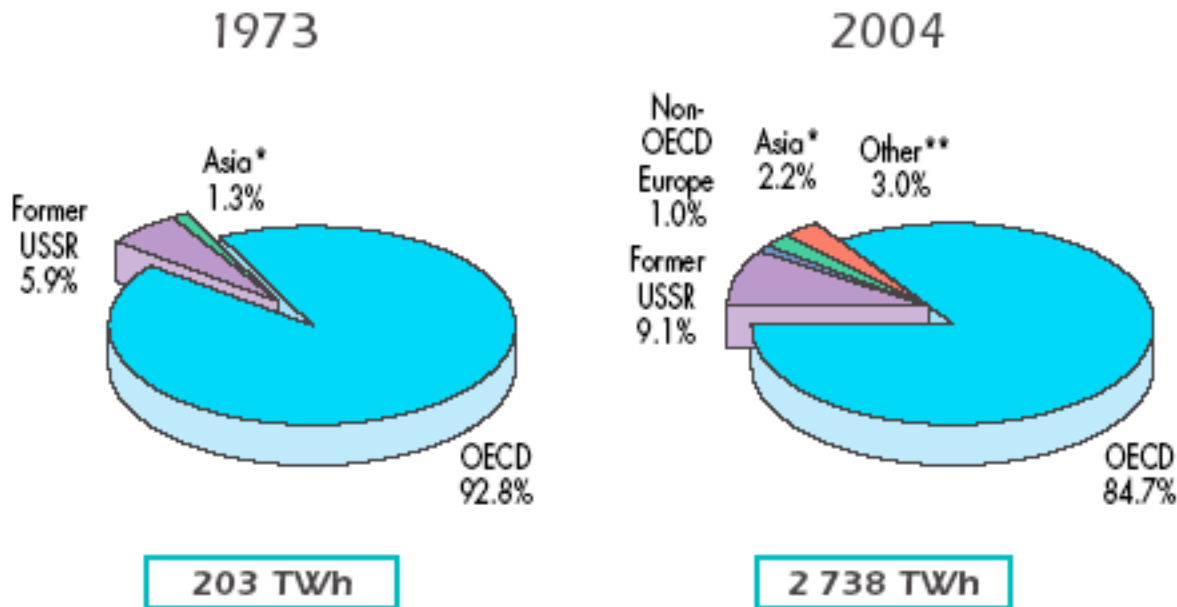


Producers	Hard Coal (Mt)	Brown Coal (Mt)
People's Rep. of China	2 226	*
United States	951	77
India	398	32
Australia	301	71
South Africa	240	75
Russia	222	0
Indonesia	140	178
Poland	98	62
Kazakhstan	79	0
Colombia	61	4
Rest of the World	257	406
<b>World</b>	<b>4 973</b>	<b>905</b>

2005 data

# Nuclear Energy

1973 and 2004 Regional Shares of Nuclear Production

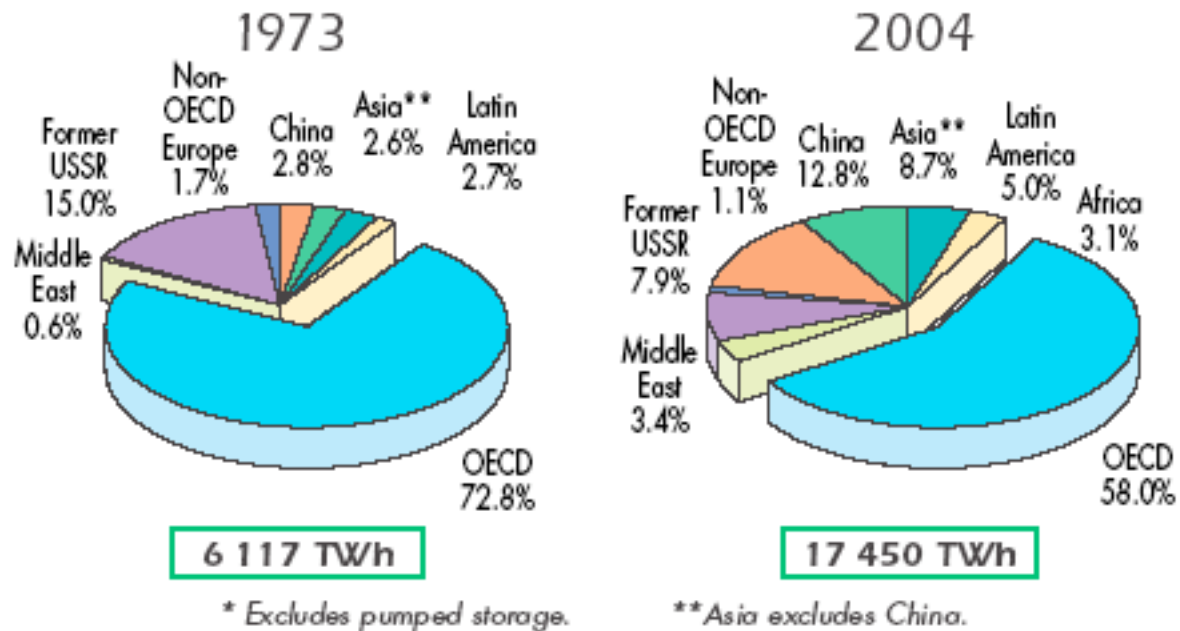


Country (based on first 10 producers)	% of nuclear in total domestic electricity generation
France	78
Sweden	50
Ukraine	48
Korea	37
Germany	28
Japan	26
United Kingdom	20
United States	20
Russia	16
Canada	15
Rest of the World*	8
<b>World</b>	<b>16</b>

2004 data

# Electricity

## 1973 and 2004 Regional Shares of Electricity Generation\*



Producers*	TWh	% of World total
United States	4 148	23.8
People's Rep. of China	2 200	12.6
Japan	1 071	6.1
Russia	930	5.3
India	668	3.8
Germany	610	3.5
Canada	598	3.4
France	567	3.2
United Kingdom	393	2.3
Brazil	387	2.2
Rest of the World	5 878	33.8
<b>World</b>	<b>17 450</b>	<b>100.0</b>

2004 data

**Portugal**

# Energy Consumption

Energy consumption per capita in the **EU25** was equivalent to 3.6 toe in 2005, compared to 7.8 toe/capita for the **USA** and 4.1 toe/capita for **Japan** (both 2003 data). Per capita energy consumption varies greatly from one Member State to another, reflecting in particular economic development, the degree of industrialisation and the climate.

Excluding **Luxembourg**, where energy consumption data are skewed by petrol purchases by residents of neighbouring countries, **Finland**, at 5.2 toe/capita, had the largest energy consumption per capita, followed by **Belgium** (5.0 toe/capita), the **Netherlands** (4.9 toe/capita) and **Sweden** (4.6 toe/capita). At the other end of the scale, **Latvia** consumed 1.5 toe/capita, while **Lithuania**, **Poland** and **Portugal** each consumed 2.3 toe/capita.

# Energy Dependence Rate

Country	Energy Dependence Rate %
Denmark	-58.8
United Kingdom	13
Poland	18.4
Estonia	33.9
Netherlands	38.9
France	54.5
EU25	56.2
Germany	65.1
Spain	85.1
Italy	86.8
Luxembourg	99
Portugal	99.4
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**They all have proven reserves of coal, oil, gas and nuclear**

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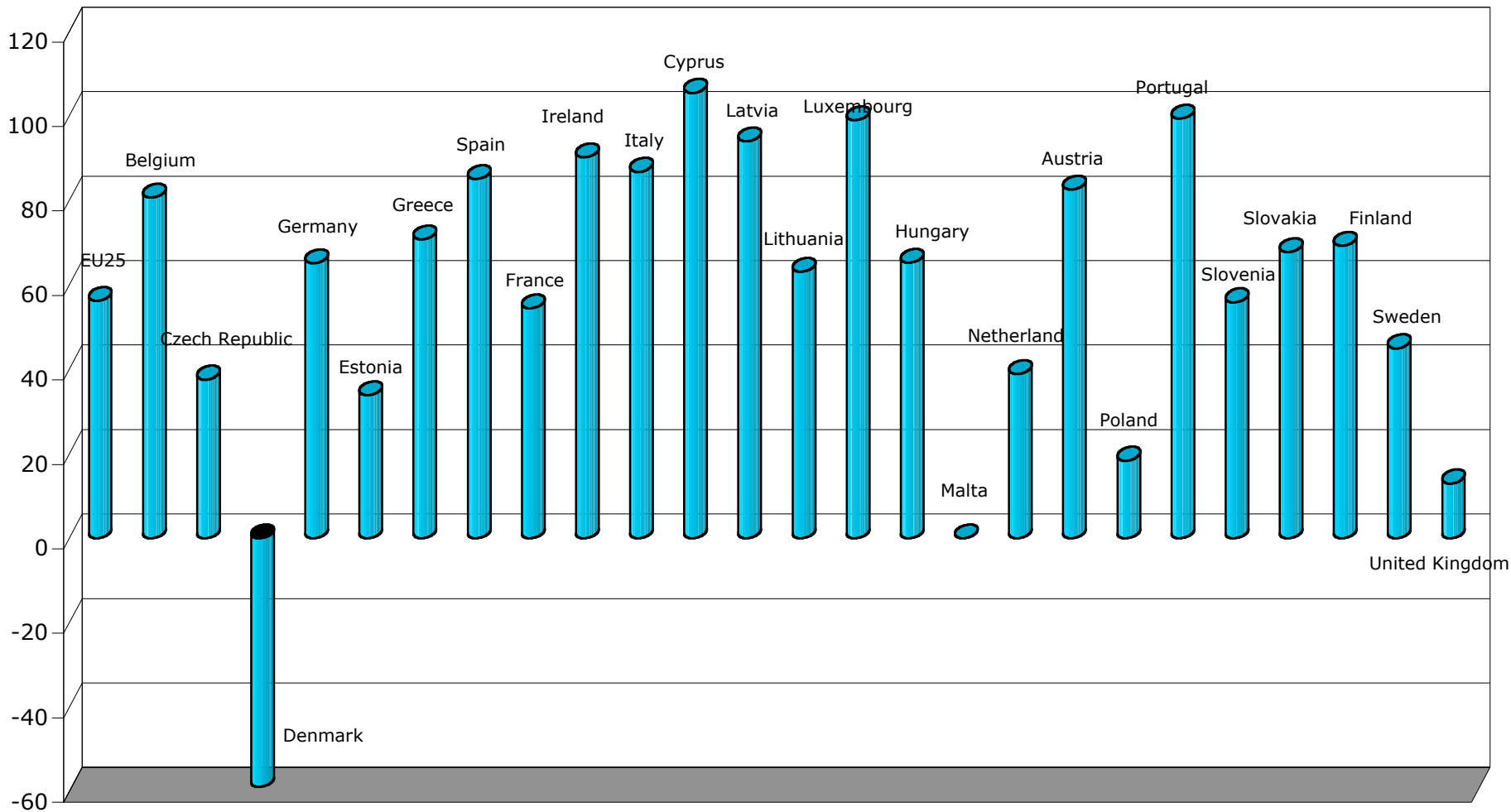
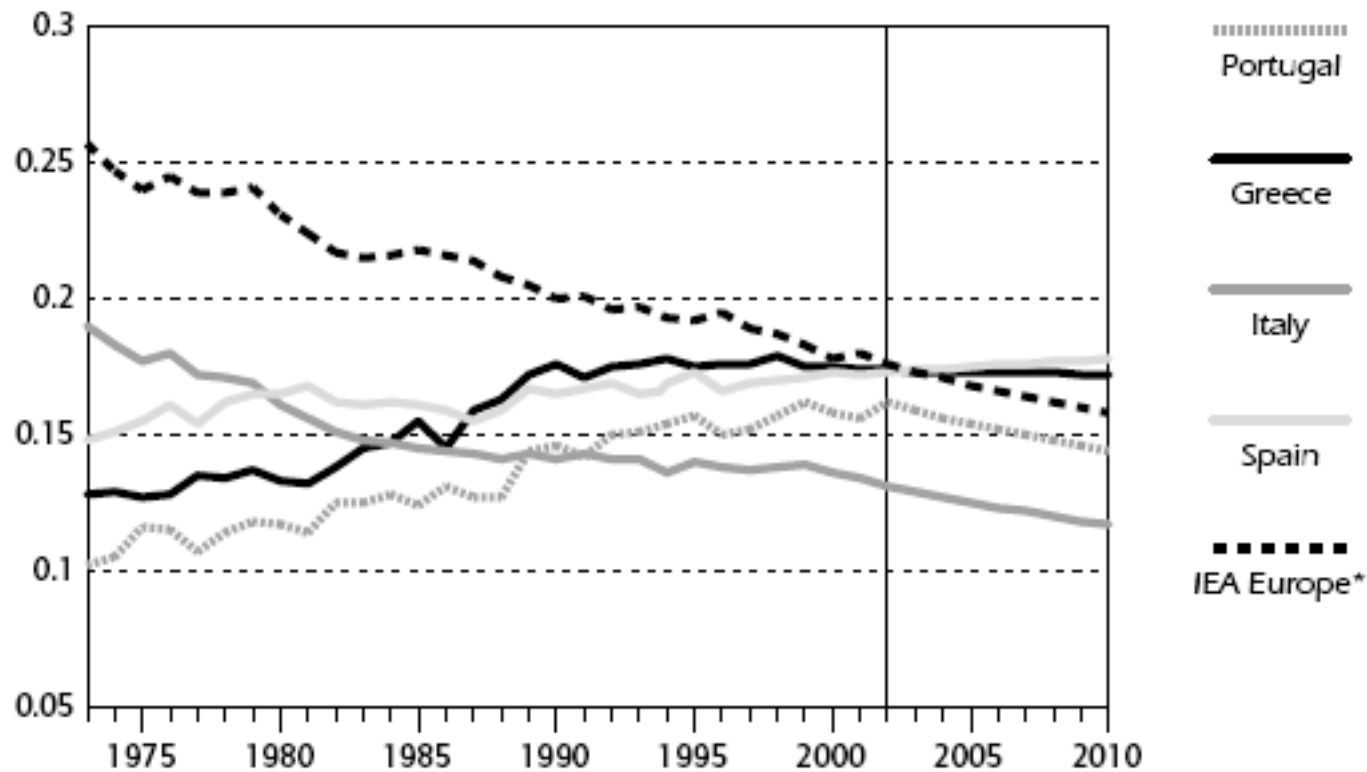


Figure 7

### Energy Intensity in Portugal and in Other Selected IEA Countries, 1973 to 2010

(toe per thousand US\$ at 1995 prices and purchasing power parities)



\* excluding Norway from 2002 to 2010.

Sources: *Energy Balances of OECD Countries*, IEA/OECD Paris, 2003; *National Accounts of OECD Countries*, OECD Paris, 2003; and country submissions.

# A Factura Energética Portuguesa

Crude oil, gas and coal.

RUBRICAS	UNIDADE	2003	2004	△ % 2004/_03	2005	△ % 2005/_04
6. IMPORTAÇÃO TOTAL (1+2+3+4+5)	10 <sup>6</sup> USD	4 425	5 777	30,5	8 515	47,4
	10 <sup>6</sup> EURO	3 912	4 644	18,7	6 845	47,4
7. (RE)EXPORTAÇÃO DE REFINADOS	10 <sup>3</sup> t	2 550	2 753	8,0	3 283	19,2
	10 <sup>6</sup> USD	840	1 000	19,0	1 531	53,1
	10 <sup>6</sup> EURO	743	804	8,2	1 231	53,0
8. EXPORTAÇÃO DE ENERGIA ELÉCTRICA	(GWh)	1 673	979	-41,5	1 481	51,2
	10 <sup>6</sup> USD	69	50	-26,9	124	145,9
	10 <sup>6</sup> EURO	61	41	-33,5	100	145,8
9. SALDO IMPORTADOR DE ENERGIA (6-7-8)	10 <sup>6</sup> USD	3 516	4 726	34,4	6 860	45,2
	10 <sup>6</sup> EURO	3 108	3 799	22,2	5 514	45,1

1 €=1,1312 USD, em 2003 (+19,6%); 1 €=1,2439 USD, em 2004 (+10,0%); 1 €=1,2441, em 2005. Fonte: Banco de Portugal.

**80%**

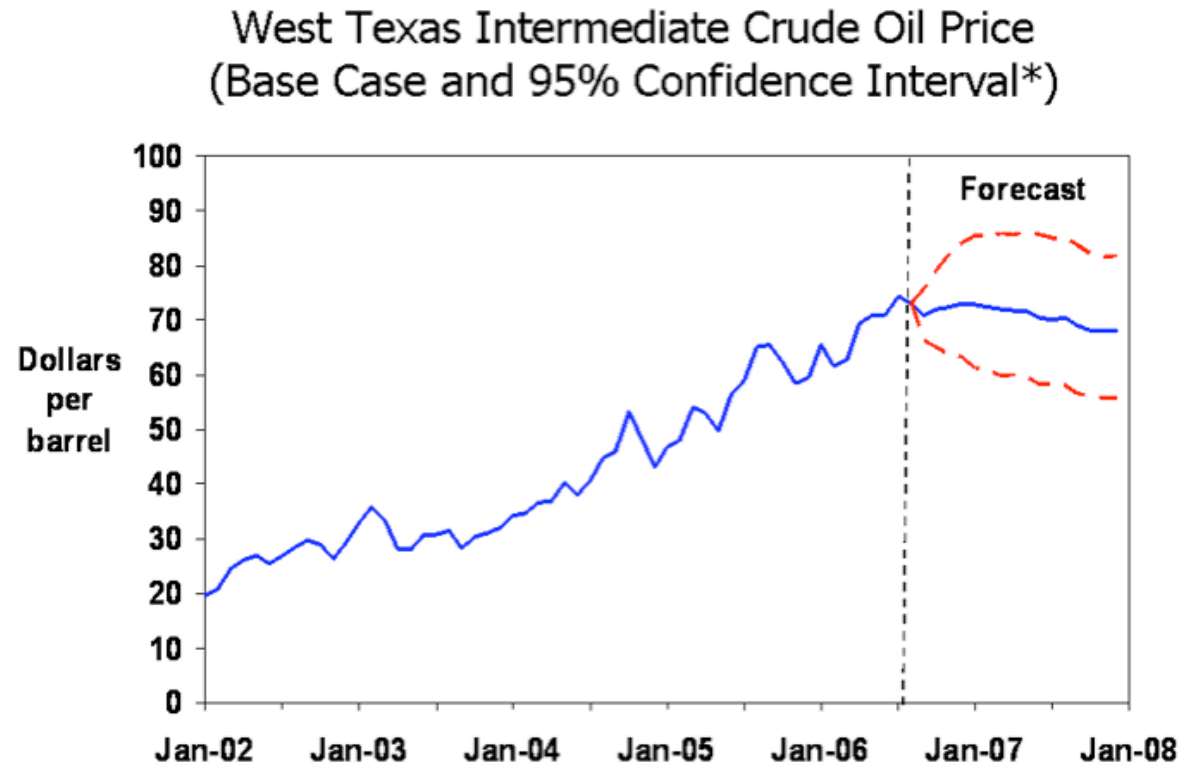
# Oil price yesterday

## Oil price \$/bbl

**Nymex Crude Future** 62.52 \$/bbl

**Dated Brent Spot** 61.01 \$/bbl

**WTI Cushing Spot** 62.76 \$/bbl



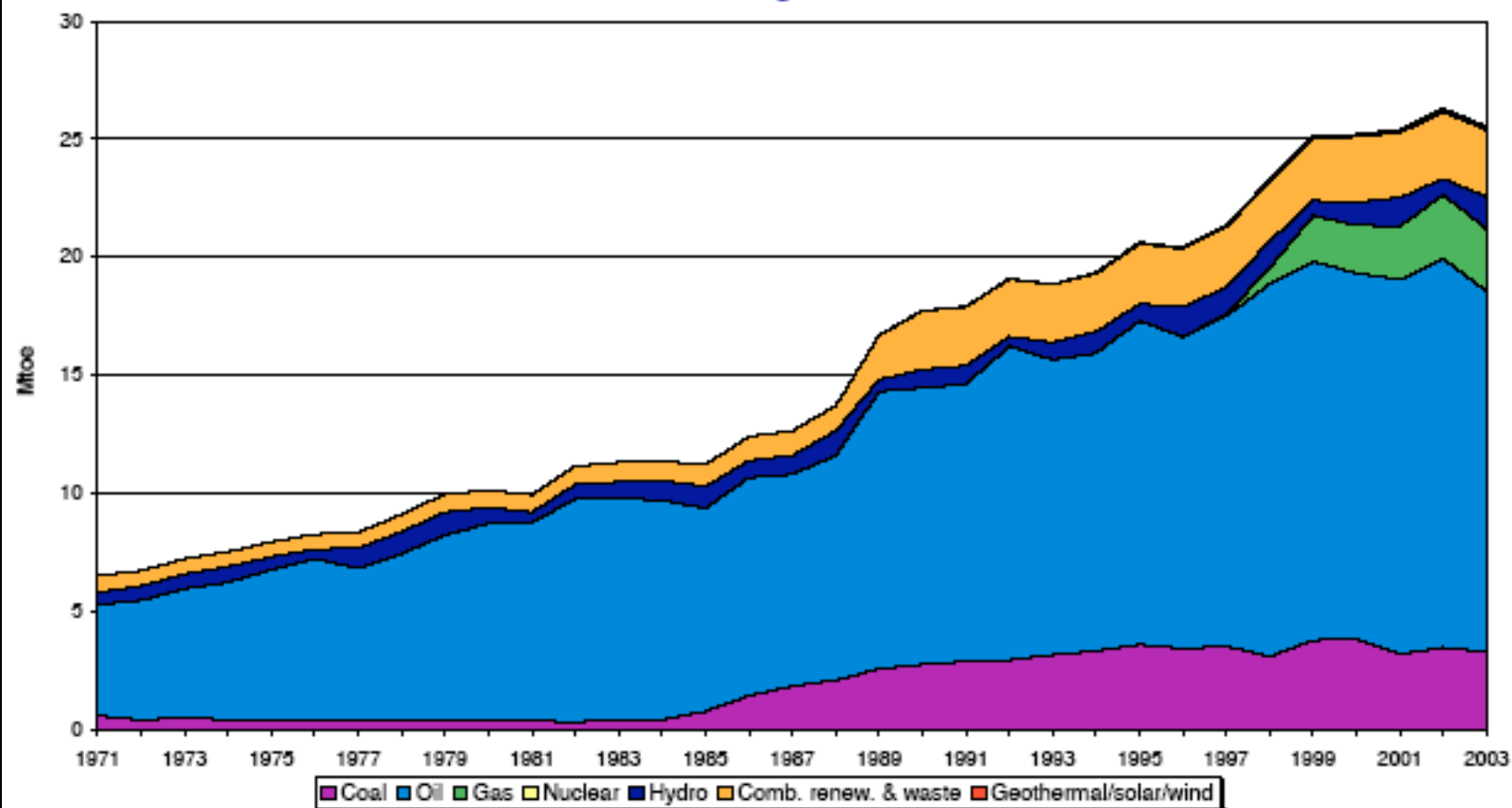
\*The confidence intervals show +/- 2 standard errors based on the properties of the model.

Short-Term Energy Outlook, September 2006





## Evolution of Total Primary Energy Supply\* from 1971 to 2003

*Portugal*

\* Excluding electricity trade.


For more detailed data, please consult our on-line data service at <http://data.iea.org>.

# Energy Prices :: Portugal

## PREÇOS MÉDIOS DE IMPORTAÇÃO DE ENERGIA - 2003/2005

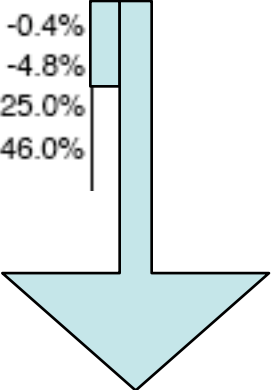
Energia primária	2003	2004	2005	$\triangle$ % 2004/_03	$\triangle$ % 2005/_04
Petróleo bruto (USD/t)	206,0	273,3	356,4	32,7	30,4
Coque de petróleo (USD/t)	41,9	55,6	59,5	32,6	7,2
Gás Natural [USD/m <sup>3</sup> (N)]	0,182	0,171	0,221	-6,0	29,2
Hulha (USD/t)	37,1	58,1	67,6	56,6	16,4
Energia eléctrica (USD/kWh)	0,036	0,035	0,062	-4,0	79,0

# Portugal:: Energy Statistics

		PORTUGAL					
		1999	2000	2001	2002	2003	2004
<b>Energy statistics</b>							
Primary energy production	1000 toe	2 656	3 109	3 895	3 643	4 336	3 894
Net energy imports		22 083	21 588	21 538	22 252	22 087	22 423
Net oil imports		16 467	15 556	16 298	15 888	15 931	15 350
Net gas imports		1 953	2 039	2 252	2 727	2 643	3 305
Gross inland energy consumption		23 892	24 108	24 760	25 966	25 367	26 172
Final energy consumption		15 982	16 937	18 069	18 342	18 333	20 122
Industry		5 263	5 518	6 311	5 812	5 845	7 208
Transport		6 043	6 517	6 548	7 126	7 086	7 277
Services and households etc.		4 676	4 903	5 210	5 404	5 402	5 636
Gross electricity generation	GWh	43 274	43 764	46 509	46 107	46 852	45 105
Final electricity consumption		36 120	38 373	39 937	41 473	43 164	44 668
<b>Energy efficiency</b>							
Final energy consumption/Gross inland consumption	in %	66.9	70.3	73.0	70.6	72.3	76.9
Efficiency of thermal power stations		43.7	44.2	45.9	45.1	45.3	46.1

# Energy Imports

eurostat		PORTUGAL						
		1999	2000	2001	2002	2003	2004	04/03
<i>in 1 000 toe</i>								
<b>Imports</b>								
Total		23 912	23 371	23 194	23 909	24 028	24 595	2.4%
among which:	Hard coal	3 790	3 968	2 967	3 461	3 263	3 204	-1.8%
	Crude oil and feedstocks	13 754	12 022	13 089	11 948	13 325	13 266	-0.4%
	Petroleum products	4 102	4 938	4 564	5 302	4 280	4 074	-4.8%
	Natural Gas	1 953	2 039	2 252	2 727	2 643	3 305	25.0%
	Electricity	312	404	322	458	507	740	46.0%



70% total

# Final energy consumption by sector

<b>Industry</b>	<b>35%</b>							
Total		5 263	5 518	6 311	5 812	5 845	7 208	23.3%
among which:								
Solid fuels		403	465	203	177	143	87	-39.5%
Petroleum Products		2 473	2 326	2 475	1 801	1 805	3 143	74.2%
Natural Gas		435	659	831	917	918	946	3.1%
Renewables		540	547	1 255	1 314	1 320	1 321	0.1%
Electricity		1 298	1 372	1 390	1 416	1 446	1 469	1.6%
<b>Transport</b>	<b>36%</b>							
Total		6 043	6 517	6 548	7 126	7 086	7 277	2.7%
among which:								
Motor spirit		2 188	2 234	2 100	2 174	2 109	2 027	-3.9%
Diesel oil		3 059	3 439	3 636	4 147	4 129	4 339	5.1%
Jet fuel		740	790	755	742	780	840	7.8%
Electricity		31	31	31	35	37	40	6.7%
<b>Services&amp;households</b>	<b>28%</b>							
Total		4 676	4 903	5 210	5 404	5 402	5 636	4.3%
among which:								
Solid fuels		-	-	-	-	-	-	-
Gas oil		808	908	1 091	789	861	825	-4.1%
Natural Gas		54	131	204	259	279	325	16.3%
Renewables		1 168	1 168	1 169	1 171	1 171	1 180	0.8%
Electricity		1 777	1 897	2 014	2 115	2 228	2 332	4.7%
Heat		6	7	9	13	13	16	21.1%

# Petroleum products

Industry		2 622	2 447	2 626	1 977	1 989	3 283	65.1%
<i>among which by product:</i>								
Gas/diesel oil	<b>27%</b>	383	431	469	374	367	402	9.5%
Residual fuel oil		1 375	1 266	1 292	770	815	543	-33.4%
<i>among which by sector:</i>								
Iron&steel industry		37	36	31	29	29	19	-34.5%
Non-ferrous metals		17	17	14	1	1	10	900.0%
Chemical industry		99	97	437	201	219	1 648	652.5%
Non-met. mineral prod.		1 095	956	999	826	834	844	1.2%
Food, drink, tobacco		250	255	213	209	219	192	-12.3%
Pulp, paper and print		350	325	248	165	182	67	-63.2%
Engineering & metal		39	38	34	38	42	37	-11.9%
Other industries		394	392	389	318	284	315	10.9%
Transport		5 853	6 319	6 352	6 915	6 873	7 062	2.7%
<i>among which:</i>								
Motor spirit	<b>58%</b>	2 082	2 126	1 998	2 069	2 007	1 929	-3.9%
Jet fuel		721	769	735	722	759	818	7.8%
Diesel oil		3 028	3 404	3 599	4 105	4 087	4 295	5.1%
Services & households etc.	<b>14%</b>	1 526	1 582	1 734	1 768	1 626	1 704	4.8%
<i>among which:</i>								
Gas oil		800	899	1 080	781	852	817	-4.1%
Residual fuel oil		-	-	-	190	-	110	