



’ ’ . .

&



«

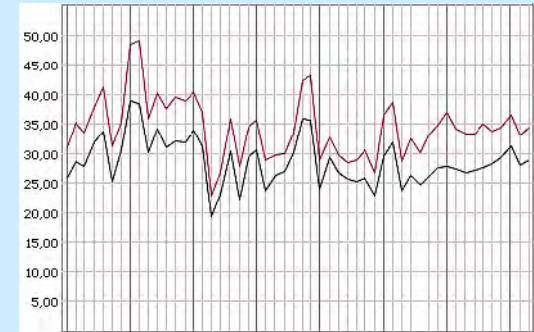
2009»

. .

COGEN EUROPE



- 
- 
- 
- 
- 
- 
- 





- $\mu - \mu -$
- $\mu$  !
- $\mu \mu$   $\mu$   $\mu$  ,
- $\mu$  ,  $\mu$  ,
- $\mu \Rightarrow \mu \mu$  ;
- 2004/8/ =  $\mu \mu \dots$
- $\mu$   $\mu$  30%  $\mu$   $\mu$  50% ,



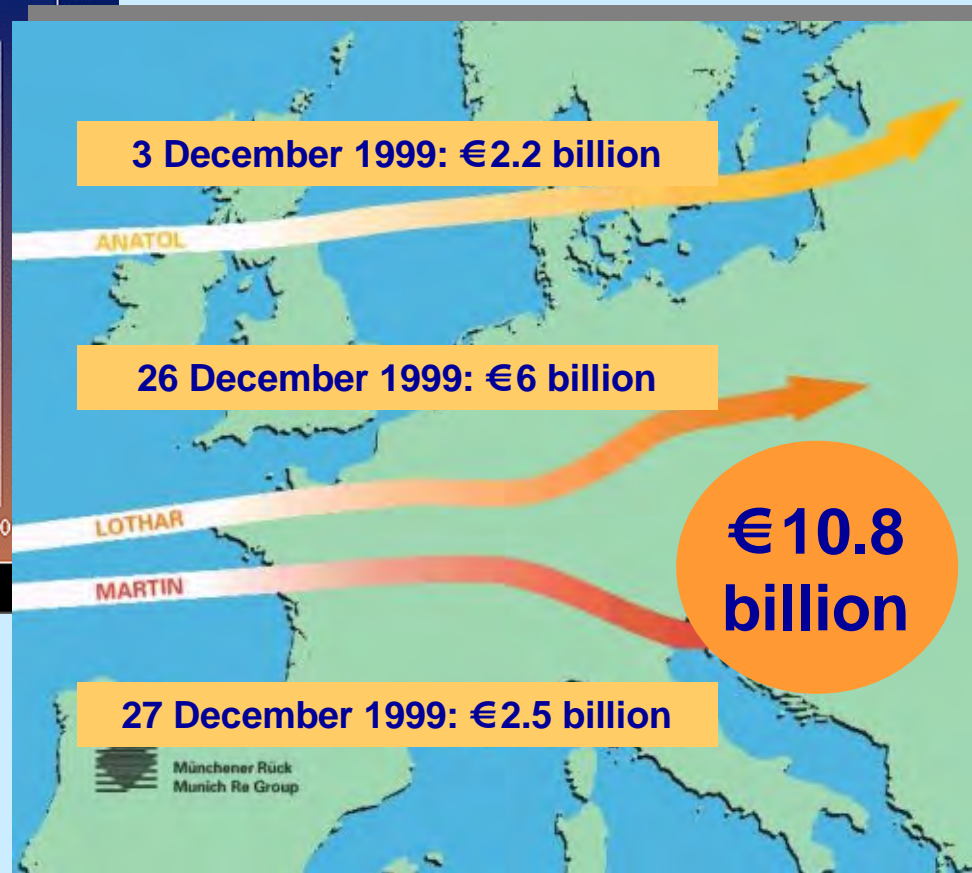
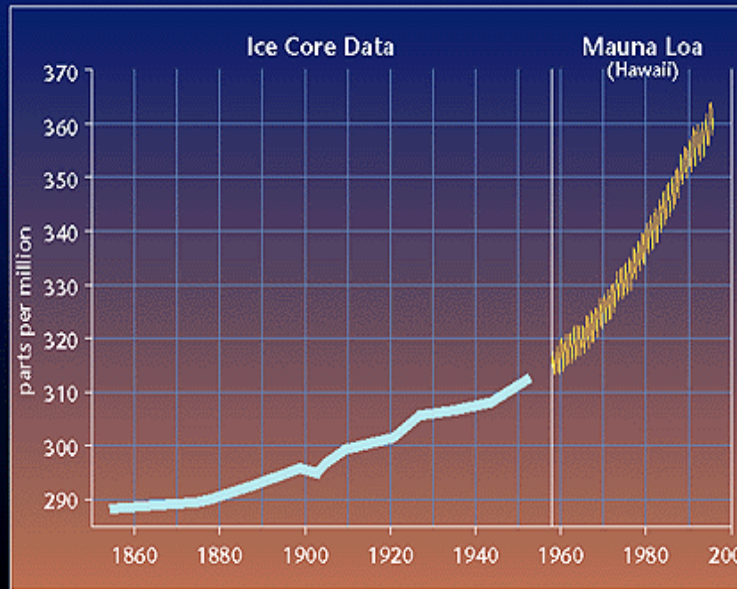
.....

... μ

μ

.

### Carbon Dioxide Concentrations



μ  
CO<sub>2</sub> ...

Source: Münchener Rückversicherungsgesellschaft



Πόλη	Ετήσιες ενεργειακές απώλειες ομίχρα (x 10 <sup>6</sup> kWh)	Μέση ισχύς ομίχρας / επιφάνεια (x 10 <sup>2</sup> kW/km <sup>2</sup> )
Μόντραλ	139	34,41
Αμστερνταμ	6,43	17,52
Νέα Υόρκη	136	14,95
Πόλη του Μεξικού	63,0	13,66
Κάιρο	27,0	13,72
Ουάσινγκτον	41,8	13,54
Χονγκ Κονγκ	12,6	11,26
Λονδίνο	36,0	11,21
Βρυξέλλες	5,76	10,78
Παρίσι	48,4	10,71
Δαμασκός	2,98	9,31
Μπουένος Άιρες	56,8	8,61
Αθήνα	14,9	8,11
Βουδαπέστη	9,44	7,09
Δελχί (Ινδία)	26,8	5,73
Θεσσαλονίκη	4,0	5,63
Μπανγκόκ (Ταϊλάνδη)	30,9	5,41
Σαντιάγο	17,3	5,29
Σγκαπούρη	17,1	5,24
Ρίο ντε Τζανέιρο	47,1	4,44
Μανίλα (Φιλιππίνες)	8,87	3,90
Βαγδάτη	5,62	3,72
Γουατεμάλα	4,33	3,66
Βόλος	0,749	3,57
Σιόνι	15,0	3,48
Κουάλα Λαμπούρ (Μαλαισία)	13,7	3,17
Αγκυρα	5,95	3,12
Λάρισα	0,674	3,08
Αθήνα	2,16	3,06
Λαμία	0,393	2,66
Ηράκλειο	0,637	2,33

Image © 2008 TerraMetrics

Image NASA  
Image © 2003 DigitalGlobe

© 2007 Google™



...



**Storms**  
(1999)  
€ 10.8  
billion

**London**  
(28 August  
2003)

**Spain**  
(Winter 2002)

**Denmark,  
South Sweden**  
(23 September  
2003)

**Heatwave**  
(2003)  
20,000  
deaths?

**Croatia**  
(23 September  
2003)

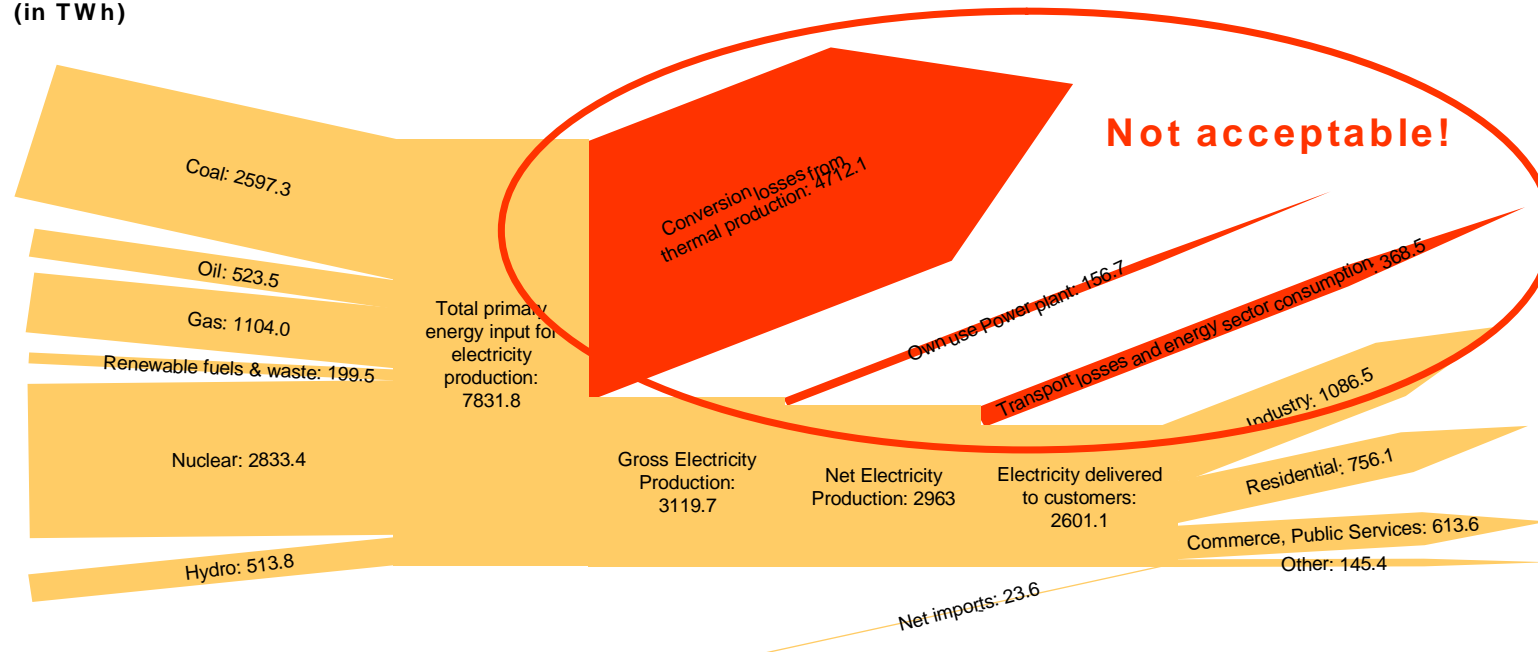
**Floods**  
(2002)  
€ 30  
billion

**Italy**  
(28 September  
2003)

**Greece**  
(12 July  
2004)



## Electricity Generation in European OECD countries (in TWh)



**33% total efficiency of the electricity supply system**

Source: OECD 1999



- $\mu$   $\mu$   $\mu$
- $\mu$   $\mu$   $\mu$   $\mu$   $\mu$
- $\mu$   $\mu$   $\mu$   $\mu$   $\mu$





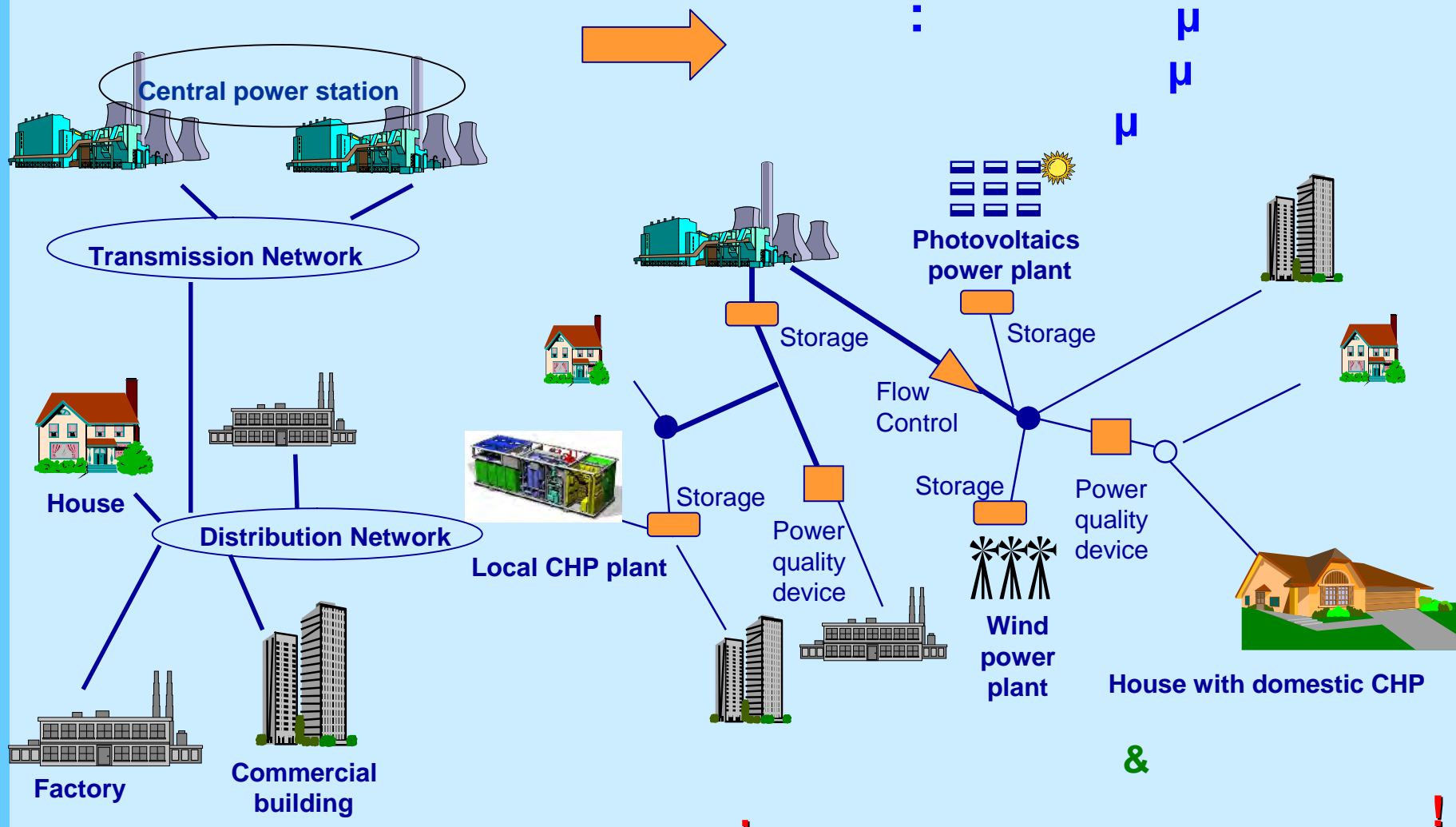
;



- , μ , μ μ ! μ

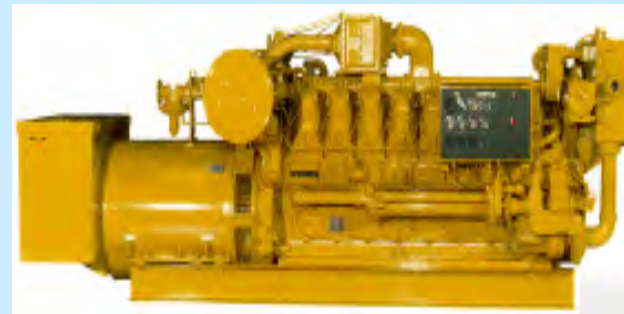
- « » !

- μ μ / , . .





**Advanced Turbines**



**Reciprocating Engines**



**Fuel Cells**



**Photovoltaics**



**Wind**



**Thermally Activated Technologies**



**Microturbines**



2  
 2 ( )  
 ,  
 /  
 2  
 2 / .  
 2



( 2 2 2 2 )  
 2004/8/



### CONVENTIONAL SYSTEM



### CHP SYSTEM





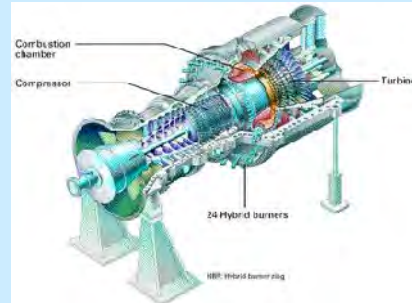
- $\mu$   $\mu$
- $\mu$   $\mu$   $\mu$
- 
- 
- $\mu$   $\mu$   $\mu$   $\mu$   $\mu$   $\mu$



## Steam Turbines



## Gas Turbines



## Engines (Diesel, Otto)



## Combined Cycles

## Micro turbines



## Fuel Cells



## Stirling Engines





η



η

η

,



η







—

—



- $\frac{1}{2}$  ,  $\frac{1}{2}$   
 $\frac{1}{2}$
- $\frac{1}{2}$   $\frac{1}{2}$  ,  $\frac{1}{2}$   
 $\frac{1}{2}$   $\frac{1}{2}$
- $\frac{1}{2}$  ,  $\frac{1}{2}$   
 $\frac{1}{2}$   $\frac{1}{2}$





•  $\mu$   $\mu$   $\mu$   
 •  $\mu$

•  $\mu$

•

•

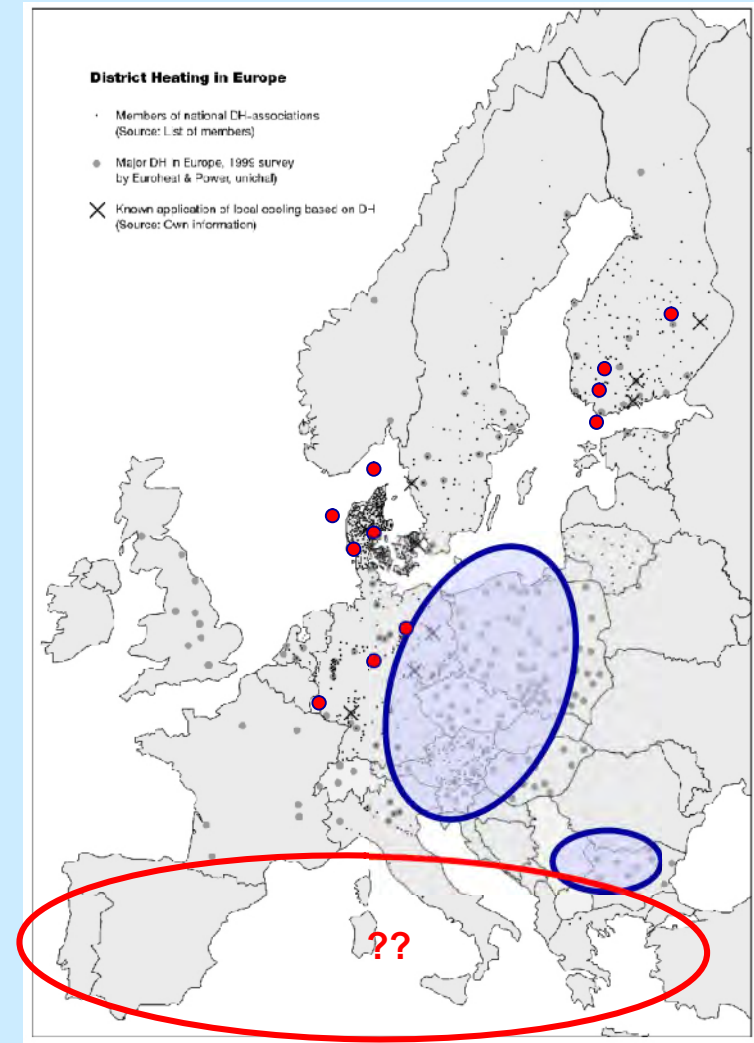
•

•

,27 +

!

! !



Source: Euroheat and Power

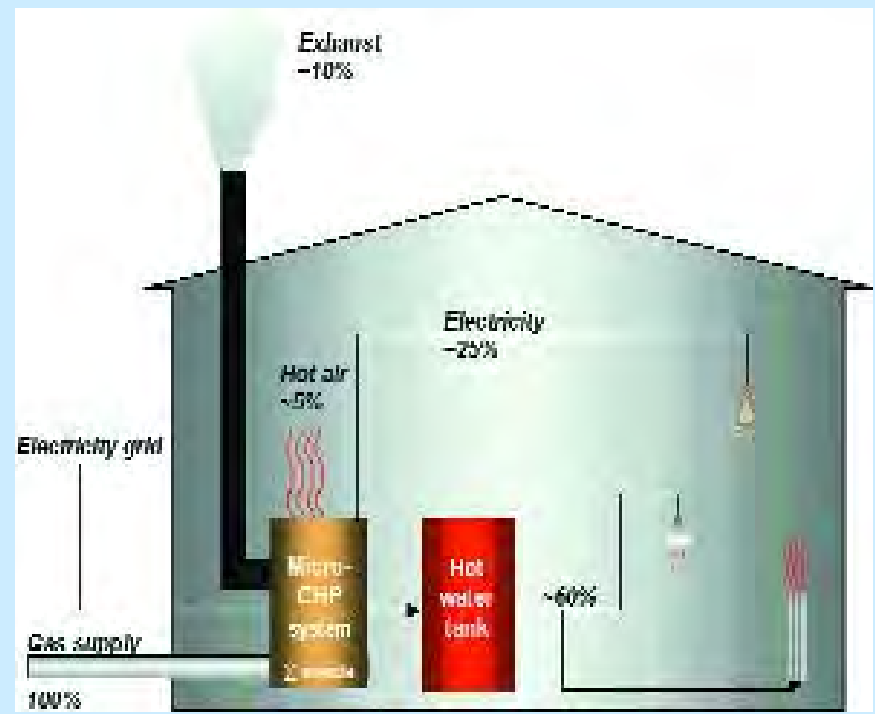


•  $\mu$  ,  $\mu$  ,  $\mu$  .

•  $\mu$   $\mu$   $\mu$  .  $\mu$  .

•  $\mu$  .  $\mu$  .

•  $\mu$   $\mu$  (  $50 \text{ kW}_e$  ) .





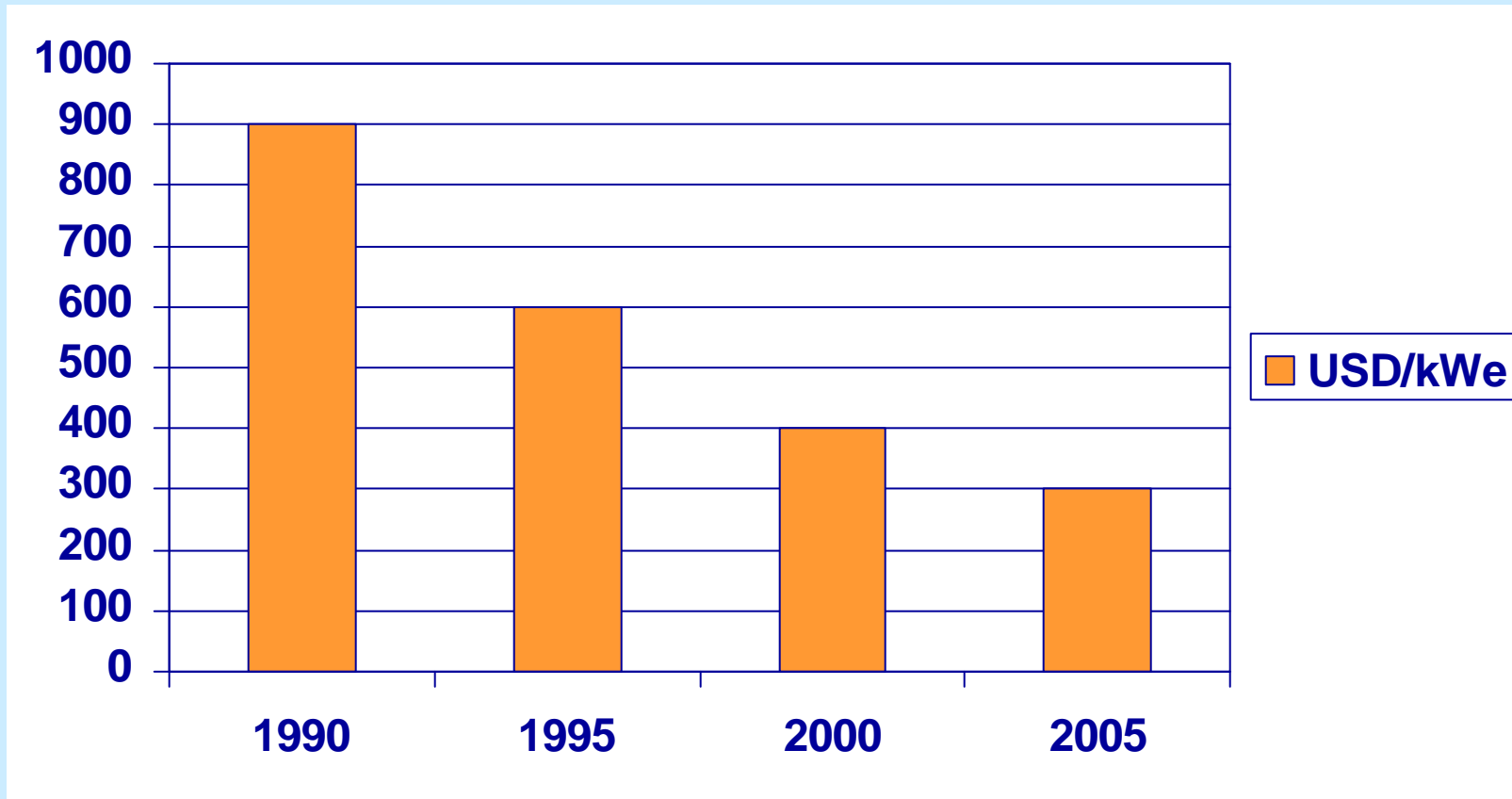
# : BERLAYMONT 2000



μ , 'Whitehall' ,



μ μ μ μ μ . . . 10 MW<sub>e</sub>,



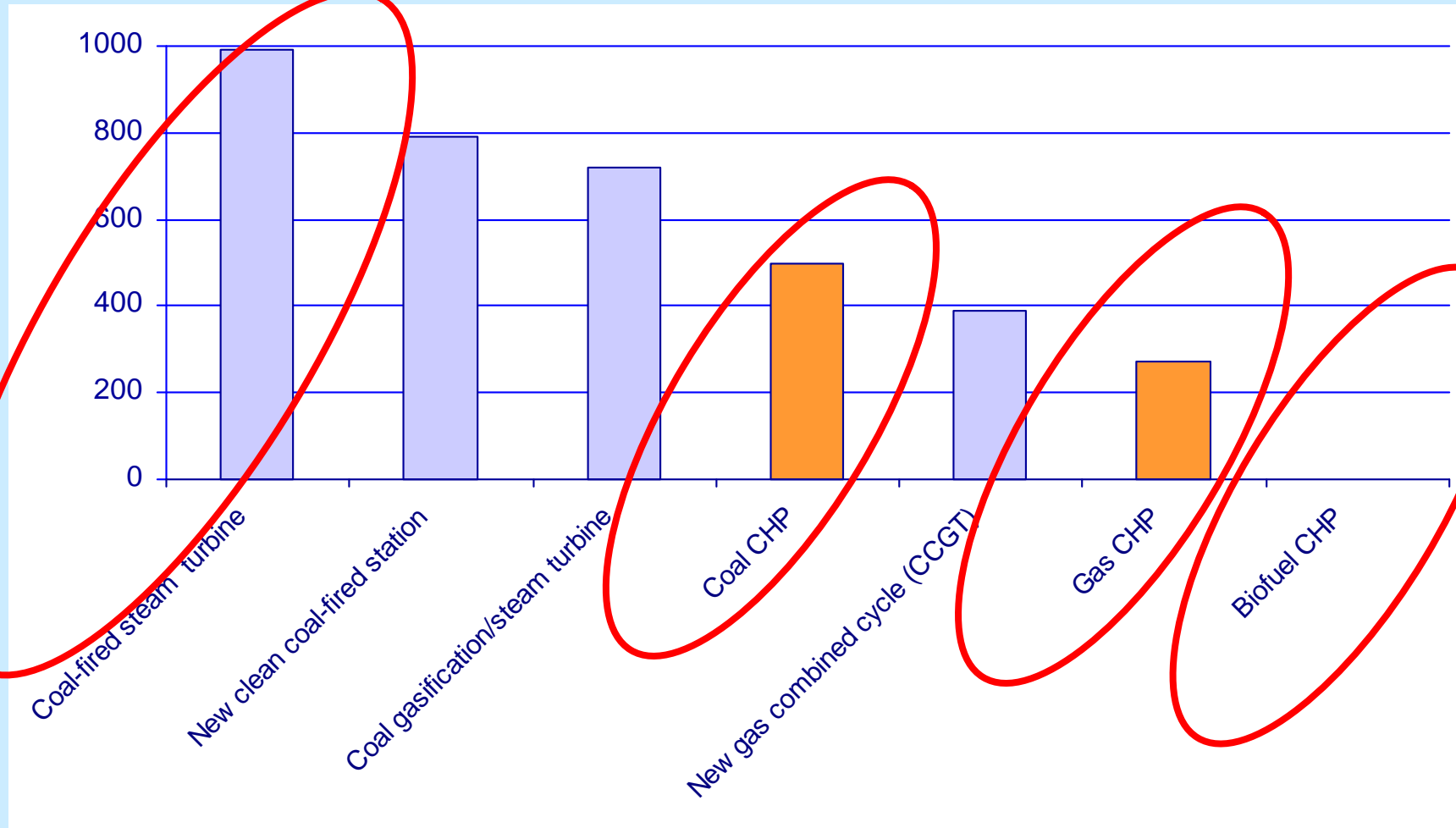


# CO<sub>2</sub>



μ

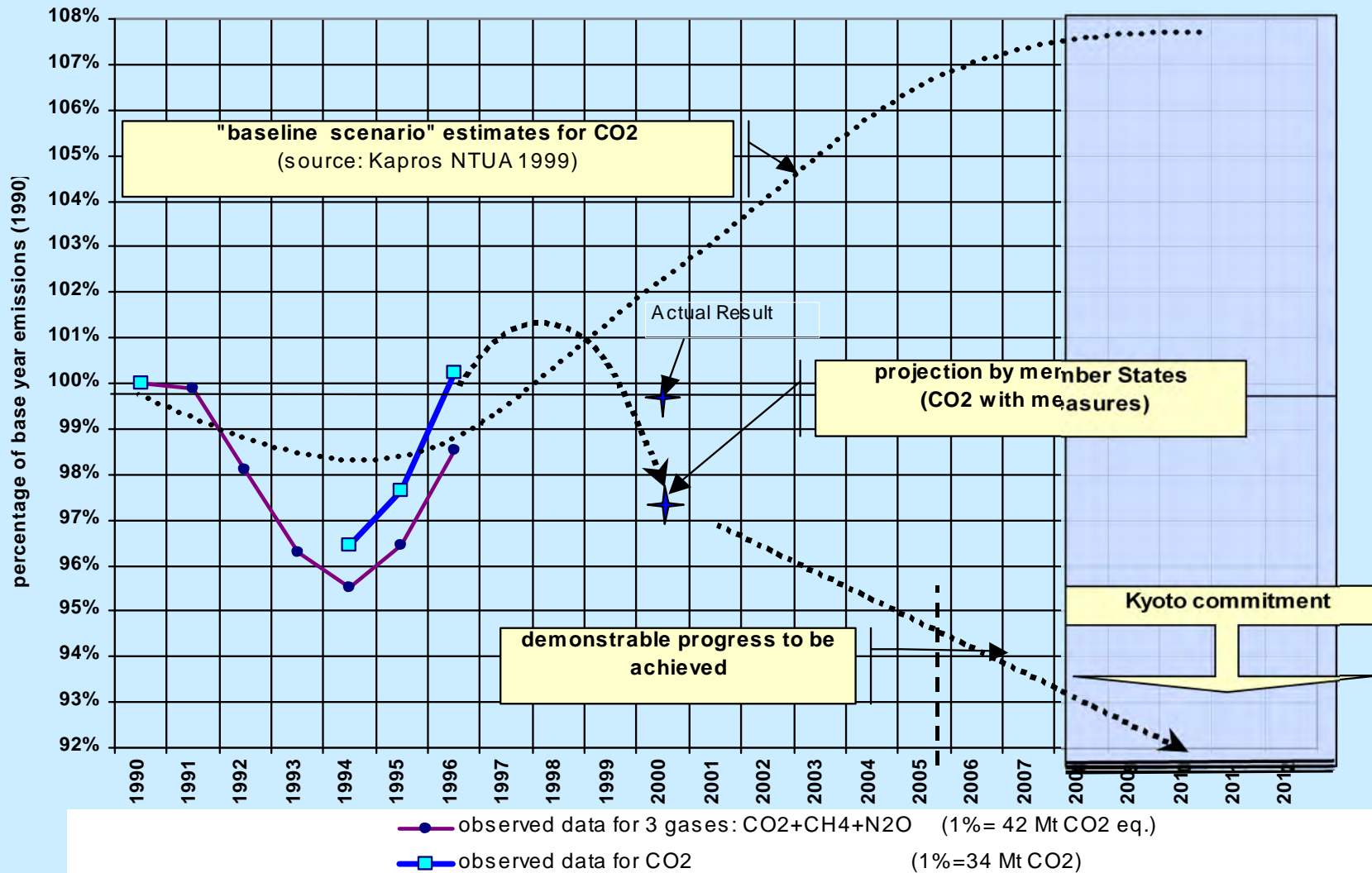
CO<sub>2</sub> - kg CO<sub>2</sub>/MWth





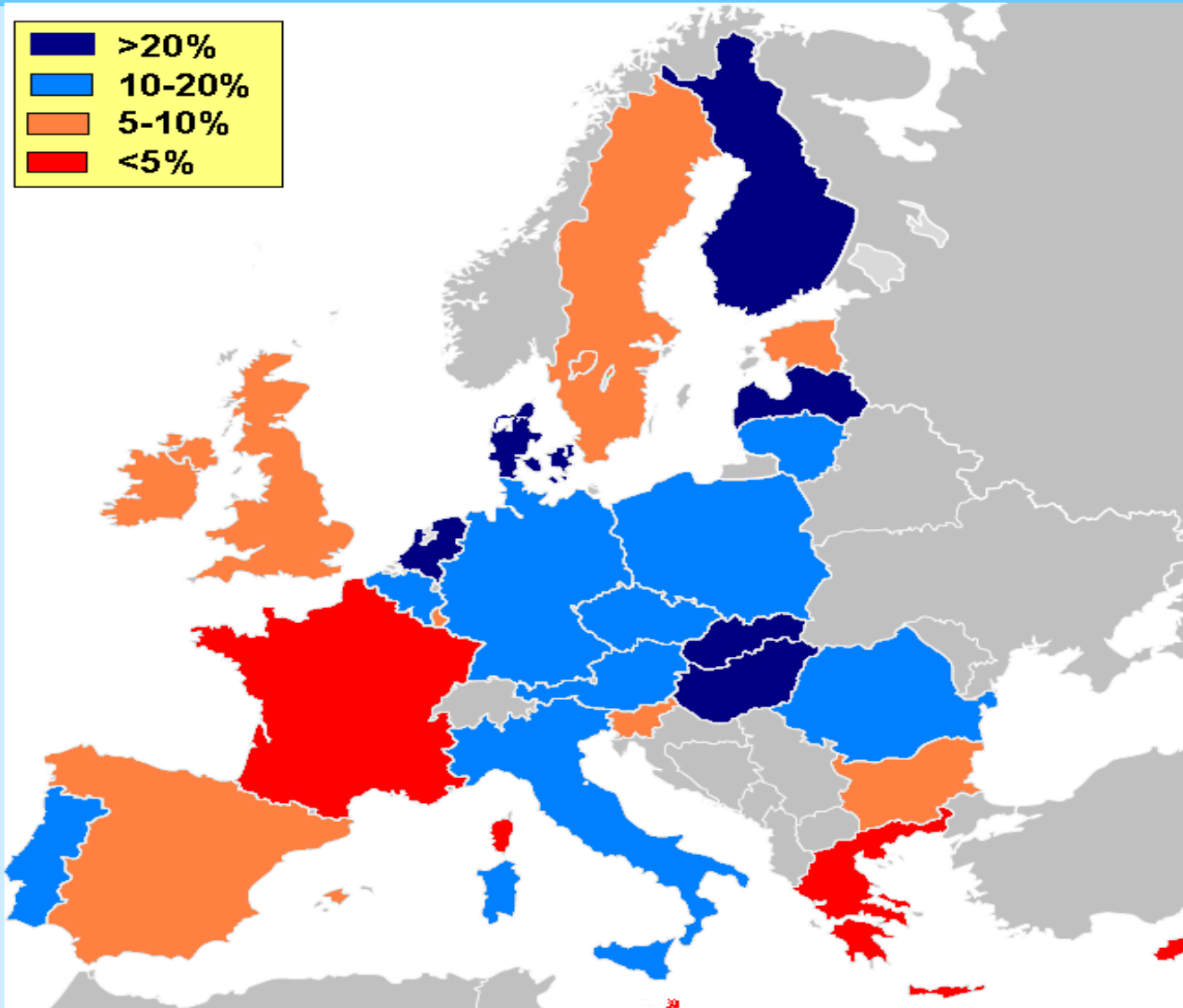
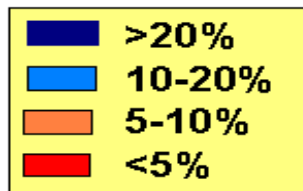
..

# 1990 - 2012





– 2007

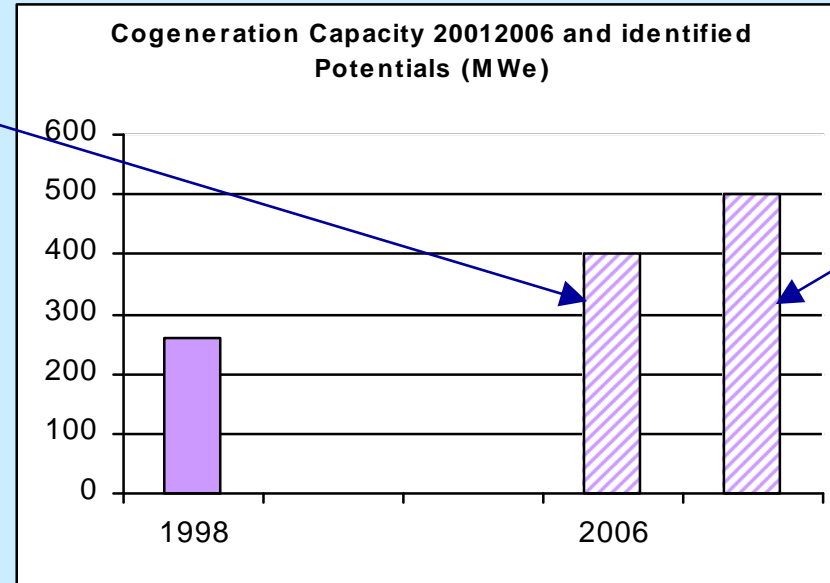


: Eurostat, COGEN Europe, Cogena





μ



μ μ

- 
- 
- 
- 
- 

μ

,

μ

μ μ 50% μ

2010 ( μ , μ )

μ μ

μ μ μ

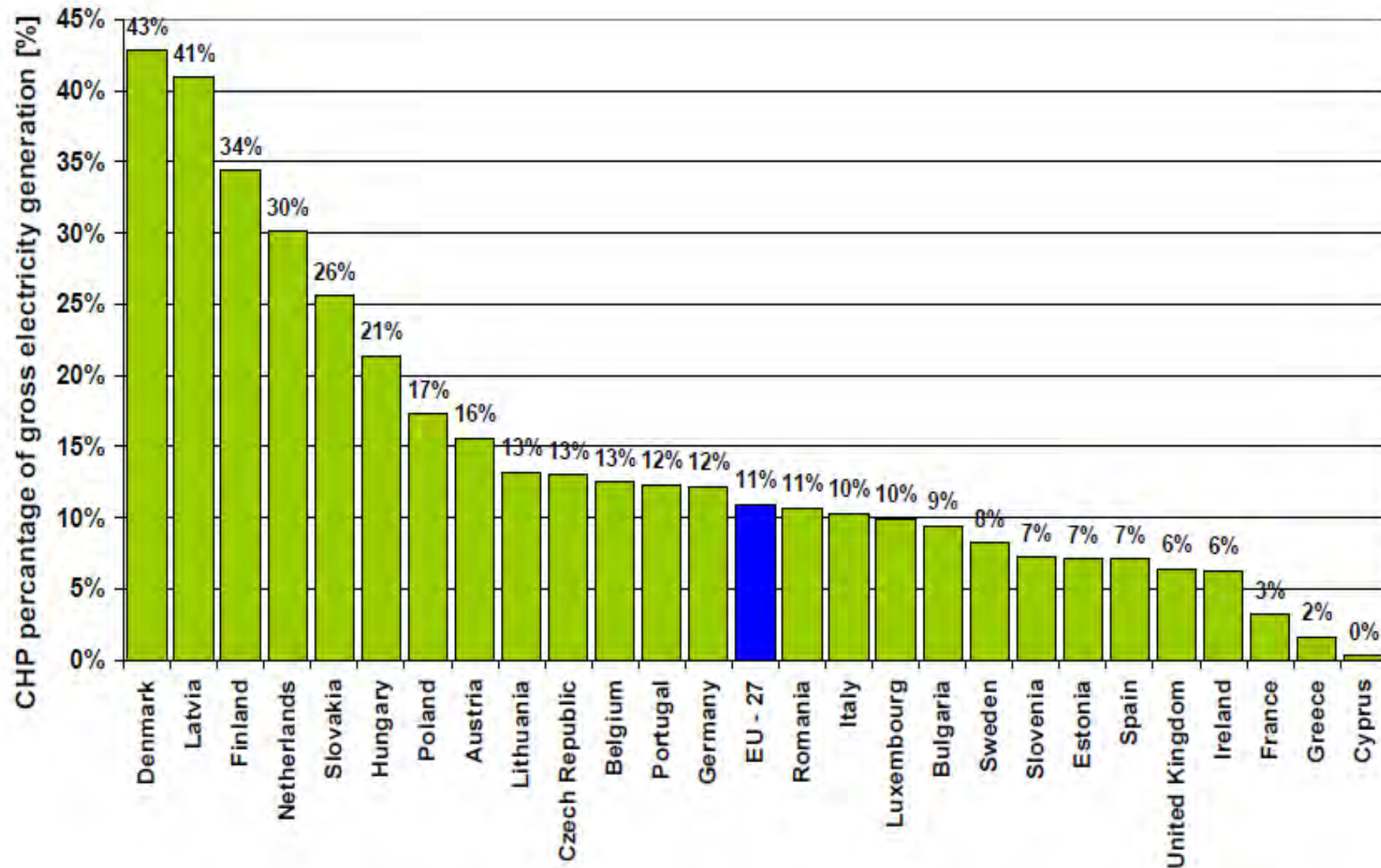
μ

&

μ



2007: Total installed CHP electrical capacity: 99,7 GW<sub>el</sub>  
Total CHP electricity production: 364,4 TWh<sub>el</sub>  
Total CHP heat production: 845,1 TWh<sub>h</sub>





- 2001: 3122 GWh (347 W, 2.4%)
- 2007: 1,4%!

- 3100 MWe
- 112 MWe
- 107 MWe

μ , μ , μ



- A E μ , μ
- - μ ; Stirling Engines; μ
- μ
- μ μ -
- μ μ
- μ μ , μ μ 18% μ μ



- $\mu$  :  $\mu$
- $\mu$   $\mu$   $\mu$
- $\mu$  /  $\mu$  ,
- $\mu$  ,
- $\mu$
- $\mu$   $\mu$  -
- $\mu$  ESCOs







- **. 3468/06:**

- 2004/8, .  
μ - μ - μ
- μ . μ μ
- 35 MWe μ
- μ μ
- μ 3 μ .
- μ







- ' 1420/15-7-09

1. « μ μ μ μ  
μ

μ »

2. « μ μ μ μ μ

»

- μ μ μ

- μ μ μ μ μ  
μ , μ .



- 
- 35 MWe
- 35 MW
- 
- 
- 
-



⌘ μ

⌘ , μ .

⌘ μ CO<sub>2</sub>.

⌘ μ μ μ 2015

- 22% μ

⌘ 2020.

⌘ μ 258 . μ

⌘ 2020.

⌘ μ μ μ μ μ & μ -

μ μ μ μ .

⌘ μ μ μ 20

GWe μ 2020, μ .



# CODE



μμ  
μμ

30 μ ,  
COGEN Europe

μ  
4

IEE and  
μ .

μμ :

- - μ
- 2004/8/ μ μ μ .





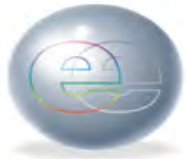
# CODE



μ «ROADMAP»  
2020.

μμ : 990.000 €





---

**6th INTERNATIONAL CONGRESS & EXHIBITION**  
for South-East Europe  
**ENERGY EFFICIENCY & RENEWABLE ENERGY SOURCES**

---

**14-16 April 2010**

For further information, please contact:

Maya Kristeva

☎ +359 32 945459

✉ office@viaexpo.com



Organiser:

[www.viaexpo.com](http://www.viaexpo.com)

Or

Hellenic Association for the Cogeneration of Heat and Power (HACHP)



[www.hachp.gr](http://www.hachp.gr)

[www.cogeneurope.eu](http://www.cogeneurope.eu)