SAIE 07 - 24 OTTOBRE 2007 Sala Armonia, Bologna Fiere

Verso la valutazione ambientale degli edifici
LCA a supporto della progettazione eco-sostenibile

La revisione del mix elettrico italiano

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ricercatore CNR-ISAC Bologna

Energia commerciale nel mondo, anno 2002
circa 444 EJ (2003, US-EIA)

44%, petrolio

26%, gas naturale

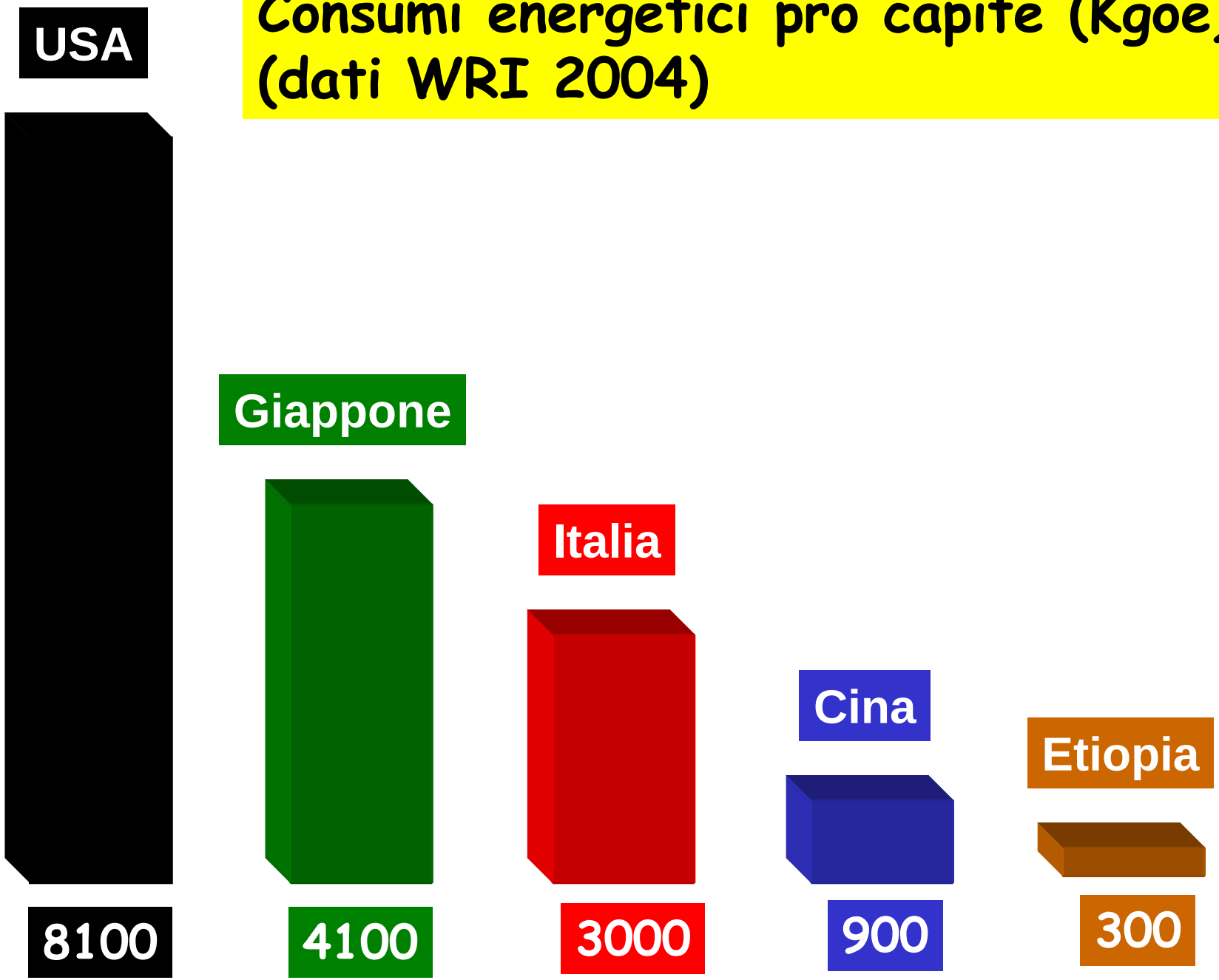
25%, carbone

95%

2,7%, rinnovabili

2,3%, nucleare

Consumi energetici pro capite (Kgoe), (dati WRI 2004)



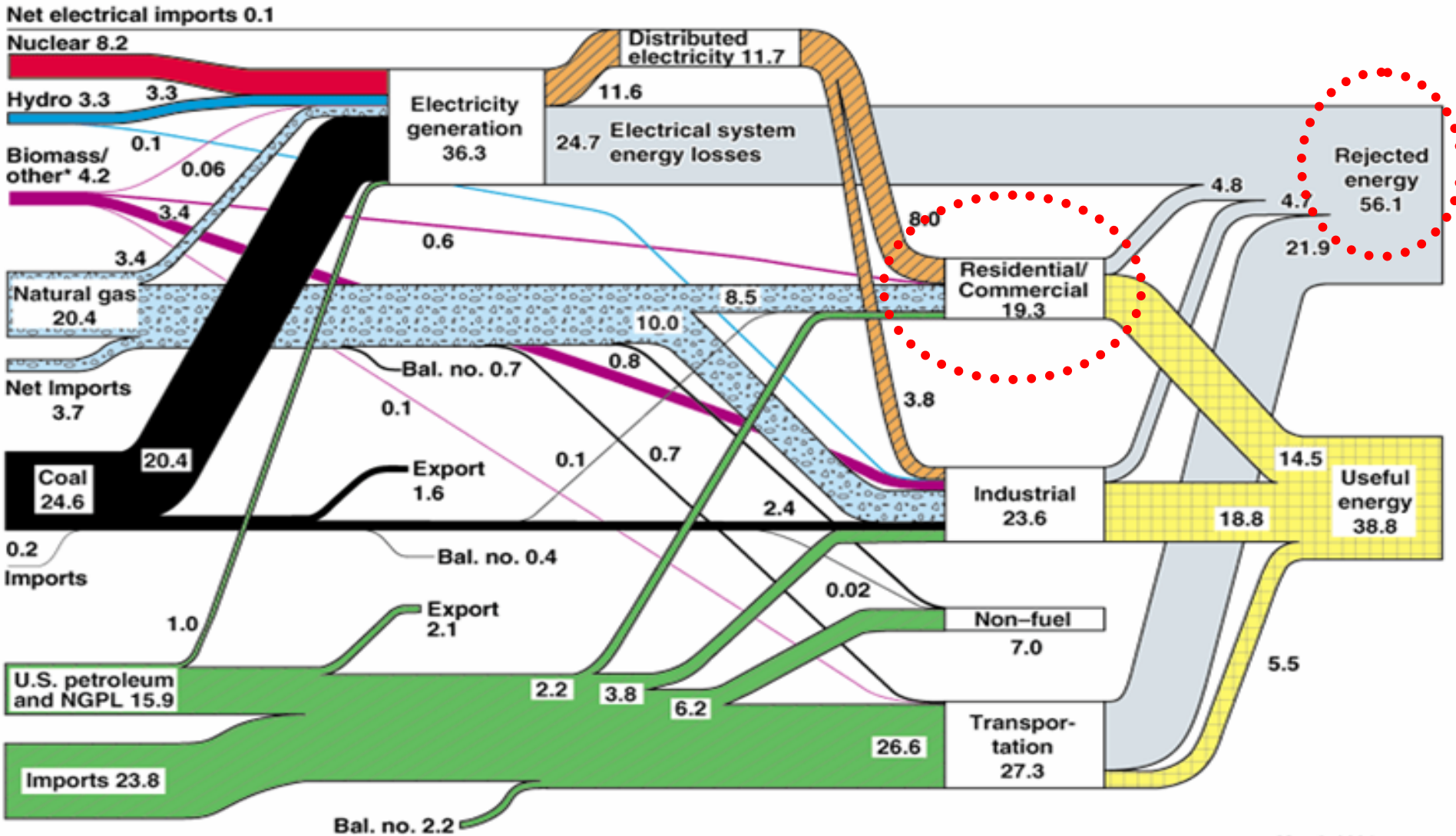
In Italia ... (dati MAP 2004)

Disponibilità e Impieghi	2003					
	solidi	gas	petrolio	rinnovabili (a)	energia elettrica (b)	totale
Produzione	0,6	11,5	5,6	12,1	0,0	29,8
Importazione	14,7	51,3	108,8	0,7	11,3	186,7
Esportazione	0,1	0,0	23,3	0,0	0,11	23,6
Variazione scorte	-0,2	-1,1	0,3	0,0	0,0	-1,0
Consumo interno lordo	15,3	63,8	90,8	12,8	11,2	193,9
Consumi e perdite	-0,8	-0,6	-6,2	-0,1	-44,4	-52,1
Trasformazioni in energia elettrica	-10,4	-21,2	-15,6	-11,0	58,3	0,0
Totale impieghi finali	4,2	41,9	69,0	1,7	25,1	141,8
-industria	4,0	17,0	7,7	0,2	11,9	40,8
-trasporti	-	0,4	42,3	0,2	0,8	43,7
-usi civili (c)	0,0	23,5	6,9	1,1	11,9	43,5
-agricoltura		0,1	2,6	0,1	0,4	3,4
-usi non energetici	0,1	0,9	6,1	0,0	-	7,2
-bunkeraggi	-	-	3,2	0,0	-	3,2

Fonte: Ministero Attività Produttive

US Energy Flow -1999

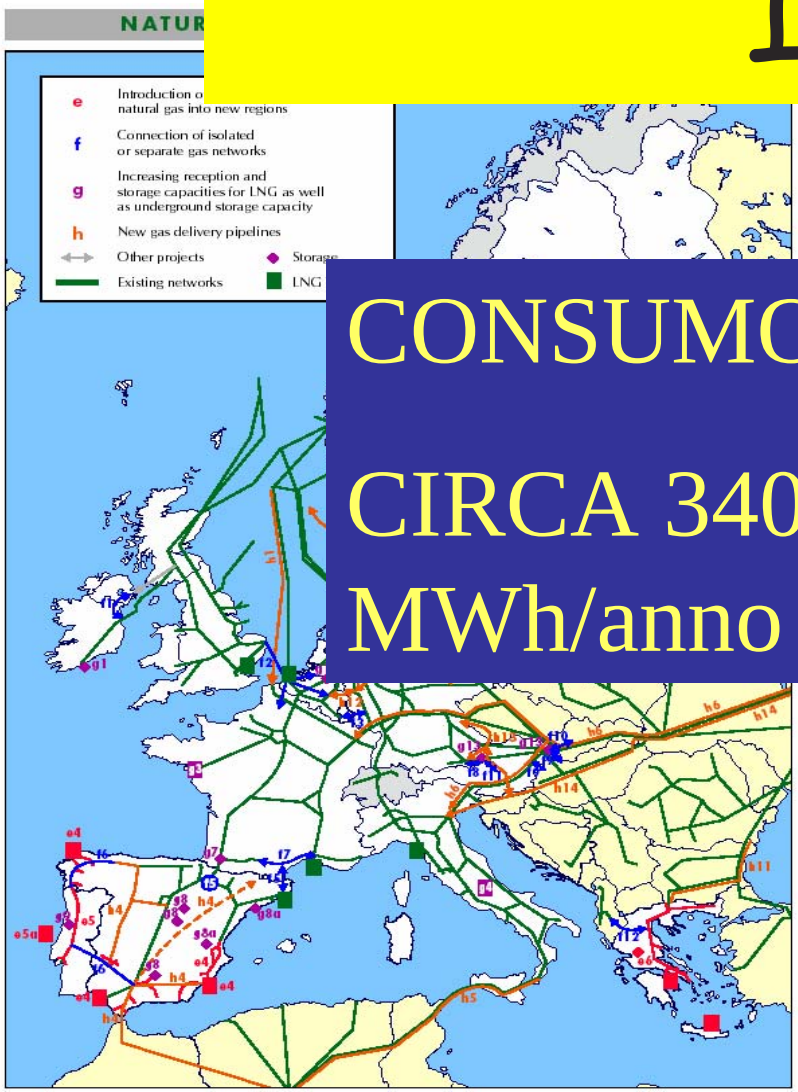
Net Primary Resource Consumption **102 Exajoules**



Source: Production and end-use data from Energy Information Administration, *Annual Energy Review 1999*
*Biomass/other includes wood and waste, geothermal, solar, and wind.

March 2001
Lawrence Livermore
National Laboratory

Energia Elettrica in Italia



CONSUMO

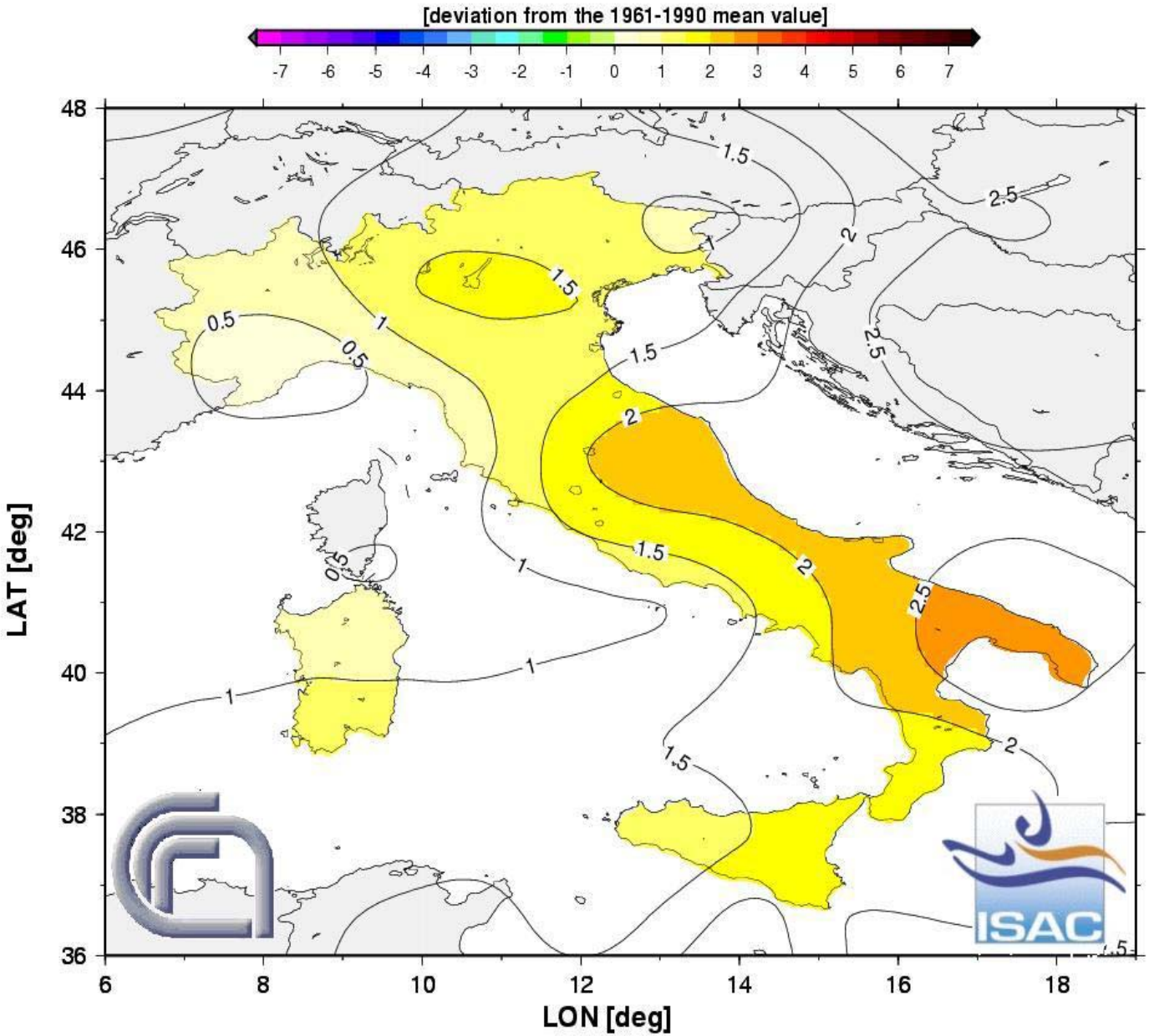
CIRCA 340.000.000 MWh/anno (GRTN 2003)

Emissioni di CO_2 in Italia nel 2001 (in milioni di tonnellate)

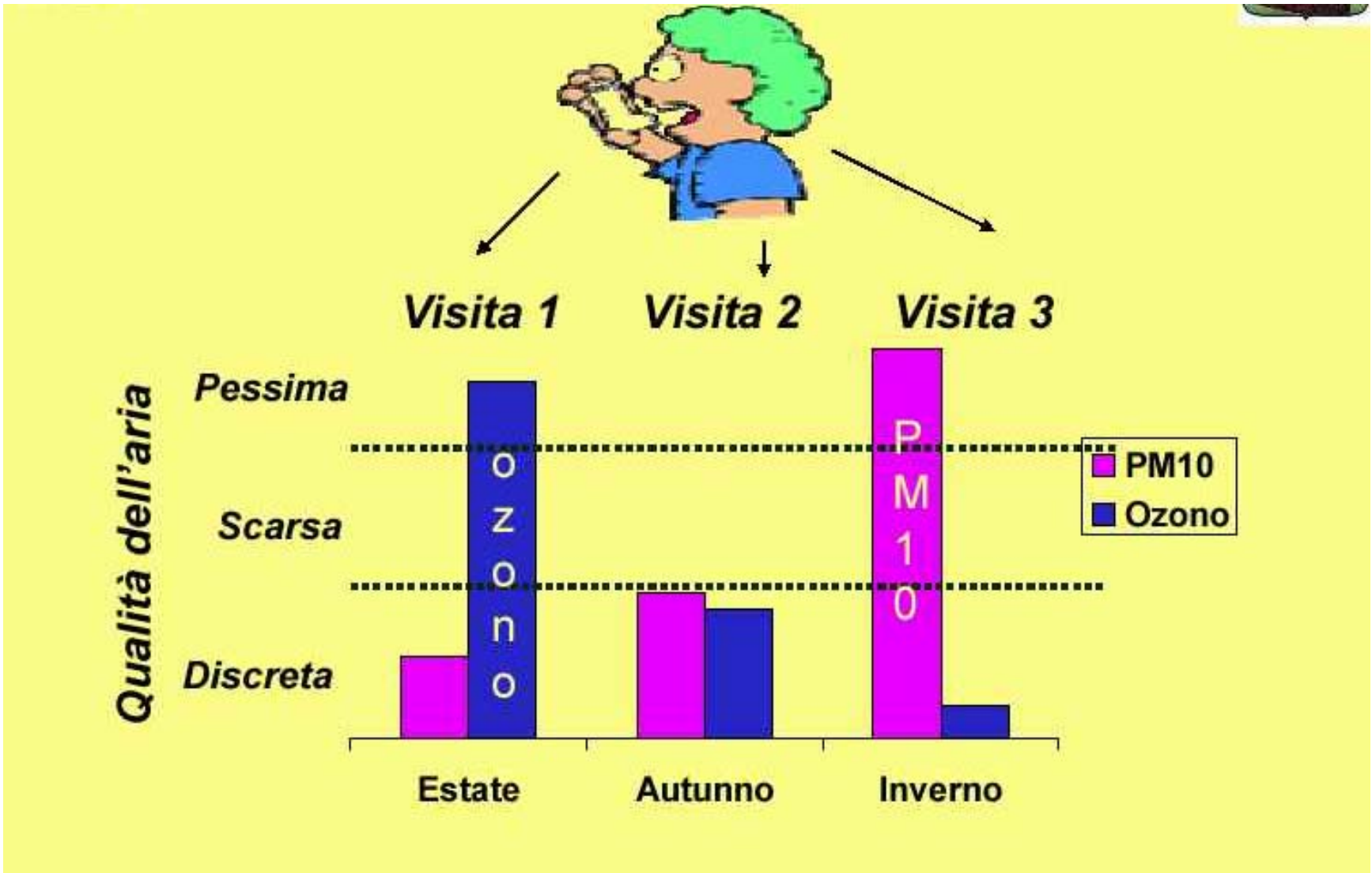
Totale emissioni di CO_2	**460,3**
Dal settore energetico:	437,3
Industrie energetiche	155,3
Trasporti	125,2
Industrie manifatturiere e delle costruzioni	77,1
Altri settori (commerciale, domestico, agricoltura, etc.)	78,1
Emissioni evaporate da carburanti	1,6

Fonte: Apat, 2003

Giugno-Luglio-Agosto 2007



OZONO <<-- NOx -->> PM


Visita 1
Visita 2
Visita 3
Qualità dell'aria
Pessima
Scarsa
Discreta
ozono
PM10
PM10
Ozono
Estate
Autunno
Inverno

COSTI SANITARI (ESTERNALITA')

Annu. Rev. Energy Environ. 2000. 25:601–27
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PUBLIC HEALTH IMPACT OF AIR POLLUTION AND IMPLICATIONS FOR THE ENERGY SYSTEM

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Key Words comparative risk analysis, environmental damage, external costs, dose-response functions, atmospheric dispersion models

Abstract Low environmental damage is one of the main justifications for continued efforts to reduce energy consumption and to shift to cleaner sources such as solar energy, especially now that supply security has slipped from public consciousness. In recent years there has been much progress in the analysis of environmental damages, in particular thanks to the ExternE (External Costs of Energy) Project of the European Commission. This paper presents a summary of the methodology and key results for the external costs of the major energy technologies. Even though the uncertainties are large, the results provide substantial evidence that the classic air pollutants (particles, NO_x and SO_2) from fossil fuels impose significant public health costs, comparable to the cost of global warming from CO_2 emissions.

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Armaroli-Po
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COSTI SANITARI (ESTERNALITA')

BeTa Version E1.02a

Benefits Table database:

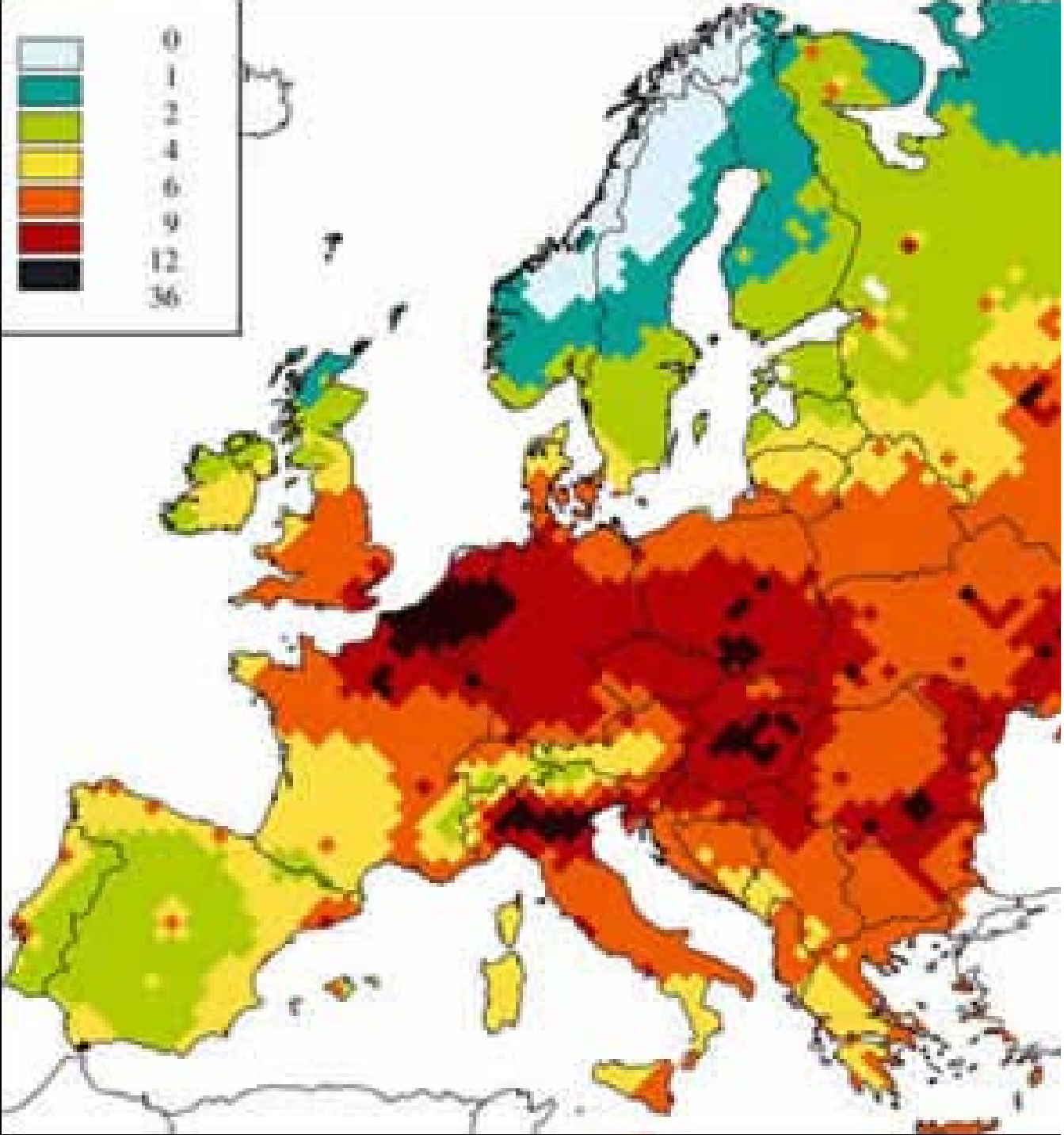
Default estimates: 1998 emission scenario

RURAL

Marginal external costs of emissions in rural areas, year 2000 prices

	SO2	NOx	PM2.5	VOCs
Austria	7,200	6,800	14,000	1,400
Belgium	7,900	4,700	22,000	3,000
Denmark	3,300	3,300	5,400	7,200
Finland	970	1,500	1,400	490
France	7,400	8,200	15,000	2,000
Germany	6,100	4,100	16,000	2,800
Greece	4,100	6,000	7,800	930
Ireland	2,600	2,800	4,100	1,300
Italy	5,000	7,100	12,000	2,800
Netherlands	7,000	4,000	18,000	2,400
Portugal	3,000	4,100	5,800	1,500
Spain	3,700	4,700	7,900	880
Sweden	1,700	2,600	1,700	680
UK	4,500	2,600	9,700	1,900
EU-15 average	5,200	4,200	14,000	2,100

Units:
€/tonne SO2
€/tonne NO2
€/tonne PM2.5
€/tonne VOC



Riduzione dell'aspettativa di vita media (in mesi) a causa di $PM_{2.5}$ antropogenici

Fonte IIASA

ELSEVIER

Applied Energy 67 (2000) 307–330

APPLIED ENERGY

www.elsevier.com/locate/apenergy

Energy content and indirect greenhouse gas emissions embedded in 'emission-free' power plants: results for the Low Countries

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Received 7 June 1999; accepted 17 January 2000

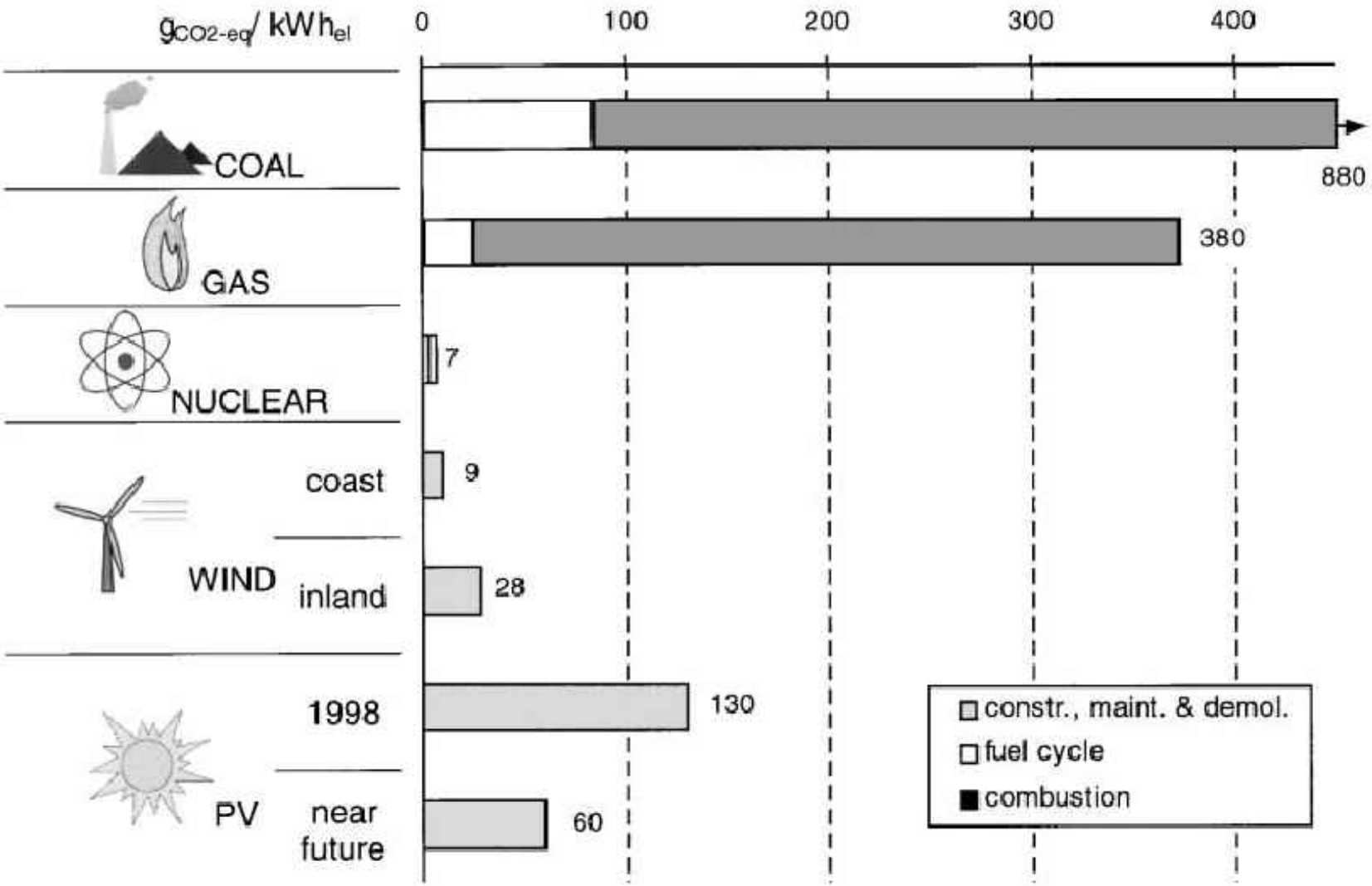
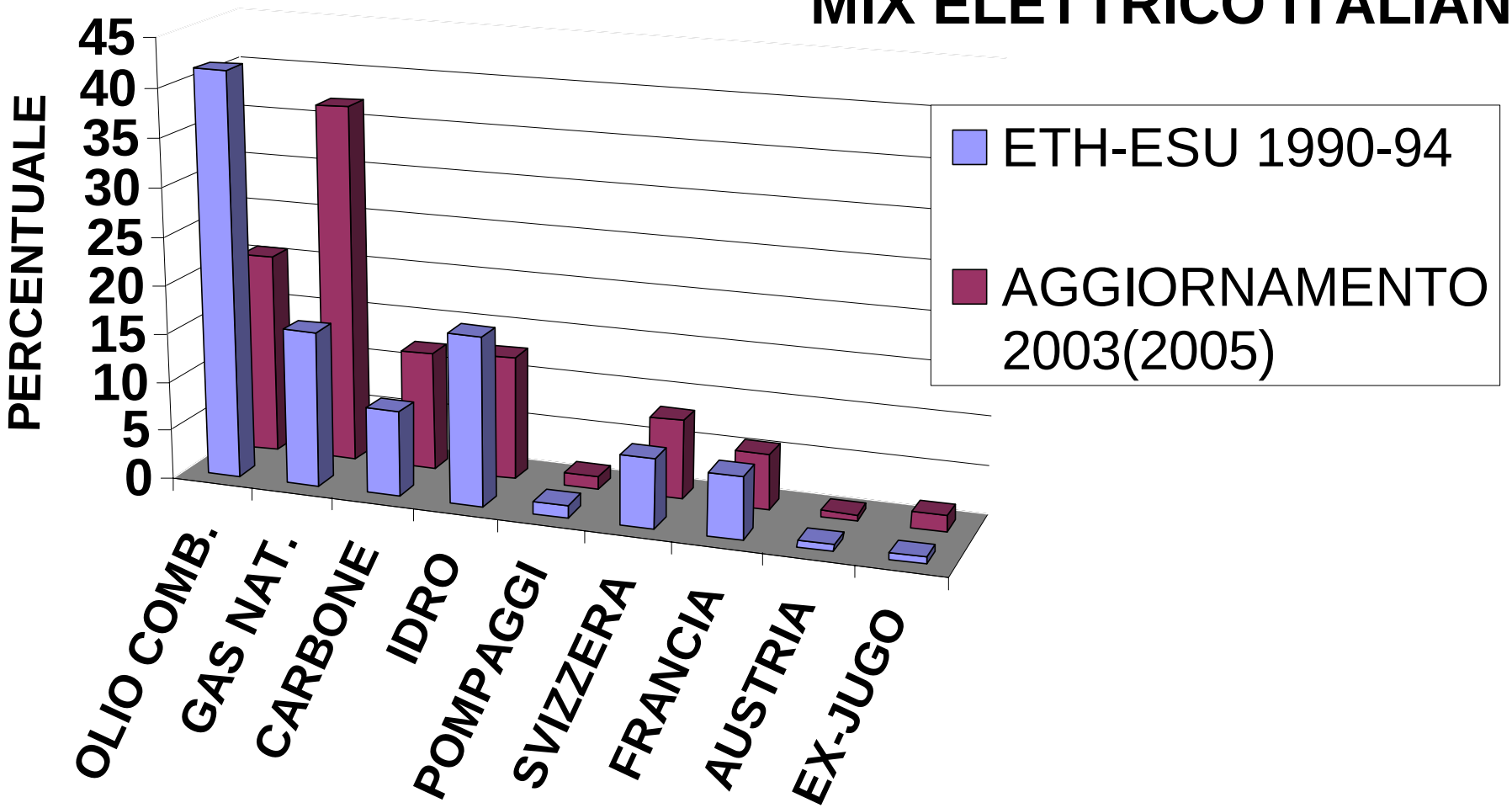


Fig. 7. GHG responsibility of power plants: cradle-to-grave approach.

MIX ELETTRICO ITALIANO



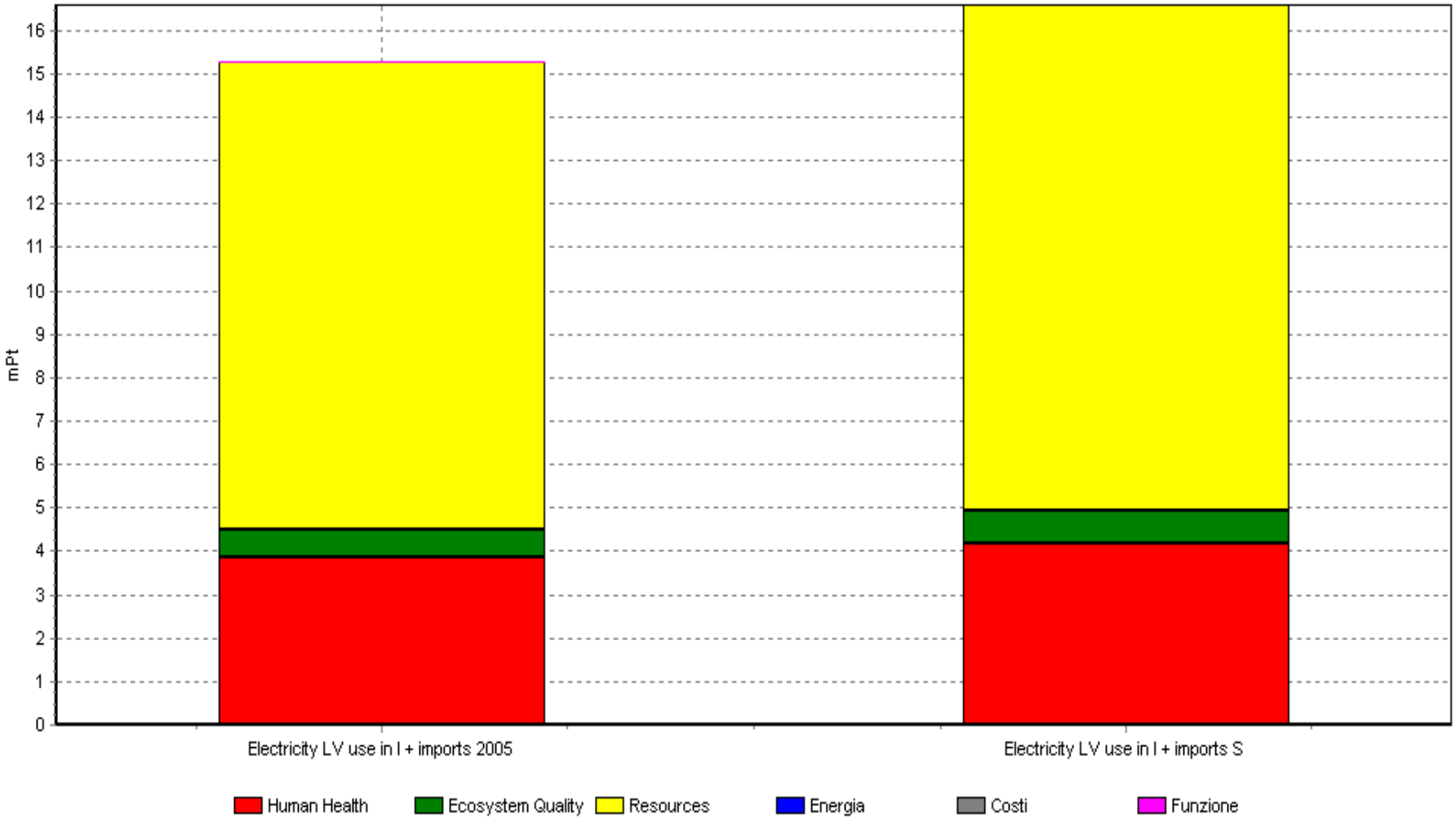
LCA: La sensibilità sulle analisi dei processi: tre esempi

- un **megajoule di energia elettrica** da parte di un qualsiasi utilizzatore finale collegato alla rete a bassa tensione nazionale

- un **pacchetto tecnologico** di grande diffusione in edilizia

- elemento dell'impianto atto a produrre il condizionamento invernale (calore) tramite energia elettrica: **pompa di calore**.

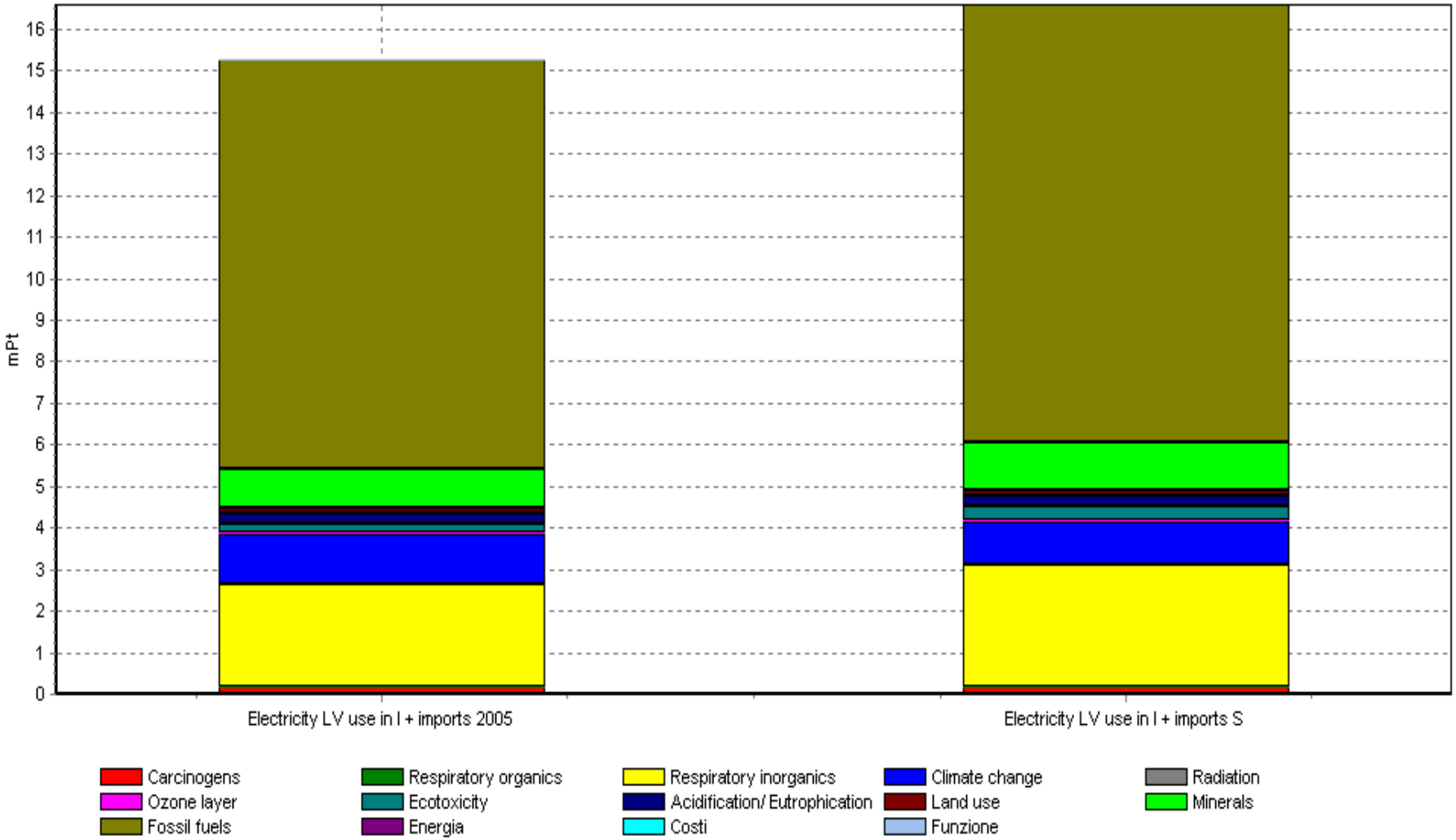
per differenti mix elettrici di differenti regioni geografiche (perché ?).



Comparing 1 MJ energy 'Electricity LV use in I + imports 2005' with 1 MJ energy 'Electricity LV use in I + imports S'; Method: Eco-indicator 99 (E) 050307 V2.03 / Europe EI 99 E/EI / single score

1. LCA E.E. da rete a bassa tensione

impatti : - 8%



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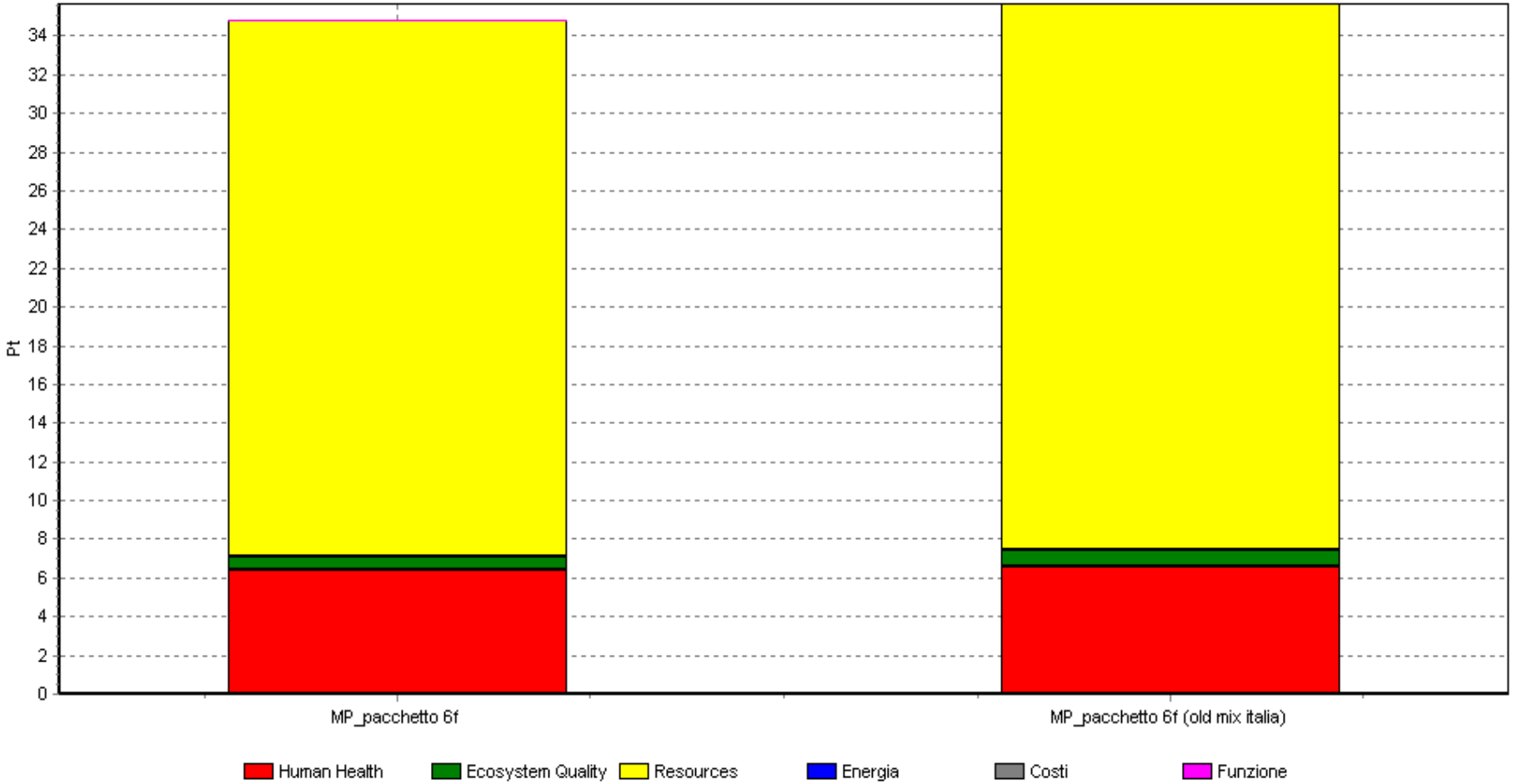
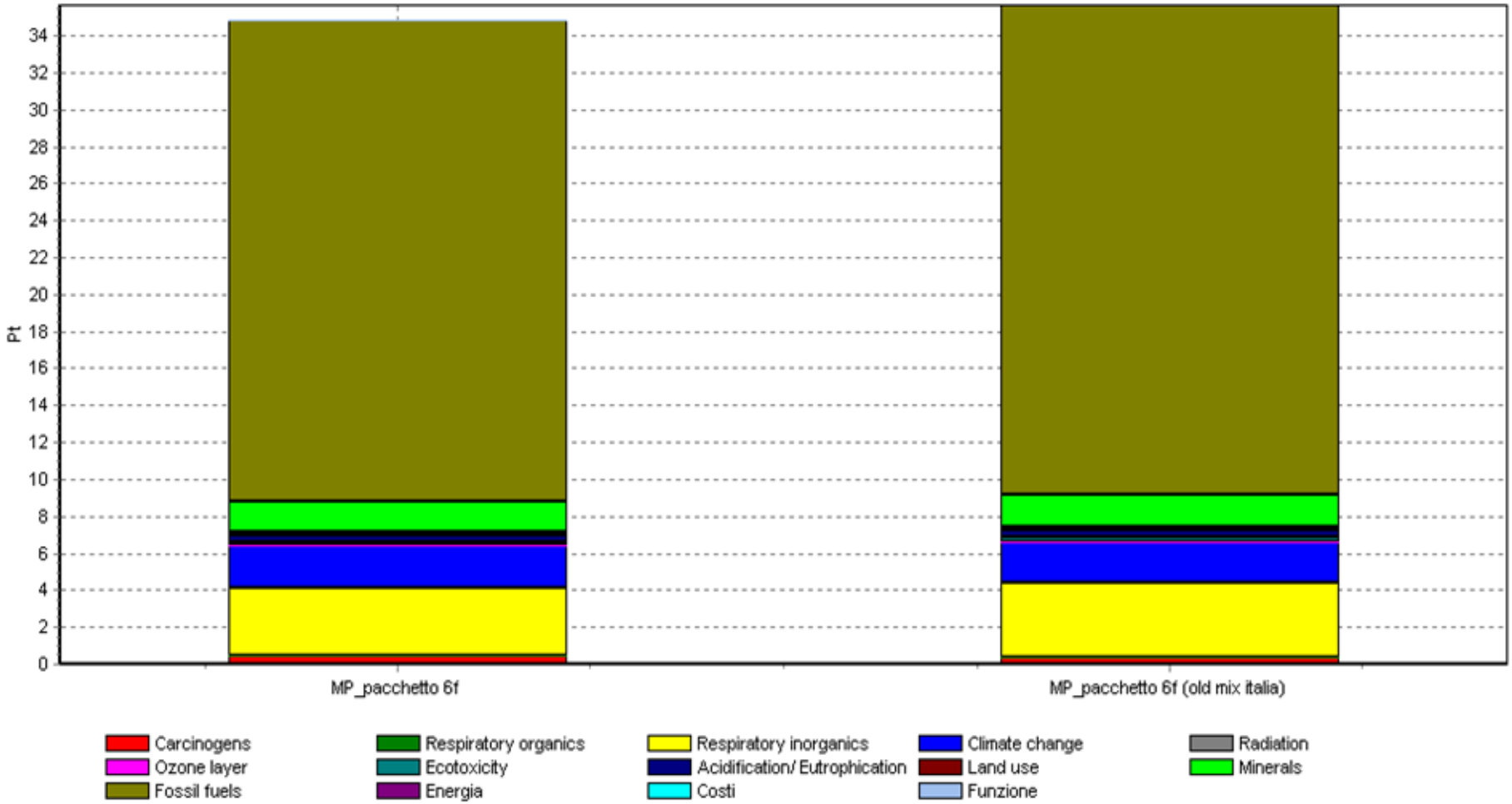


Comparing 1 p processing 'MP_pacchetto 6f' with 1 p processing 'MP_pacchetto 6f (old mix italia)'; Method: Eco-indicator 99 (E) 050307 V2.03 / Europe EI 99 E/EI / single score

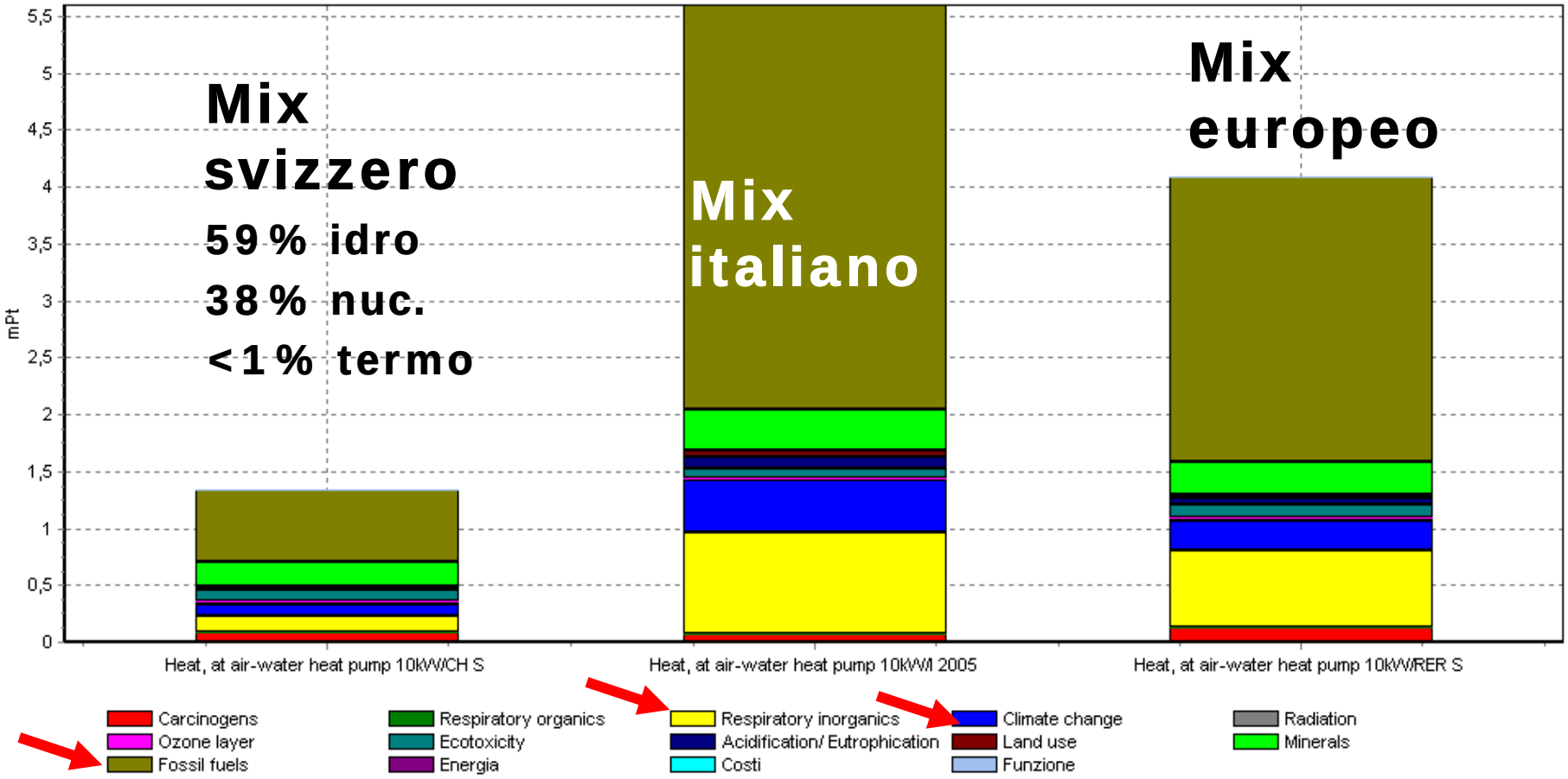
2. LCA Pacchetto “6f”

impatti : - 2%



2. LCA Pacchetto “6f”

impatti : - 2%



3. LCA pompa di calore: 1Mj calore

?

ESU (ed. R. Frischknecht N. Jungbluth),2004