

XXVIII National Seminar on Large Dams



Energy Balance

Rio de Janeiro, 27th October 2011

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Corporate Participation

BRAZIL AND WORLD DATA

POPULATION 2010 => 195 MILLIONS

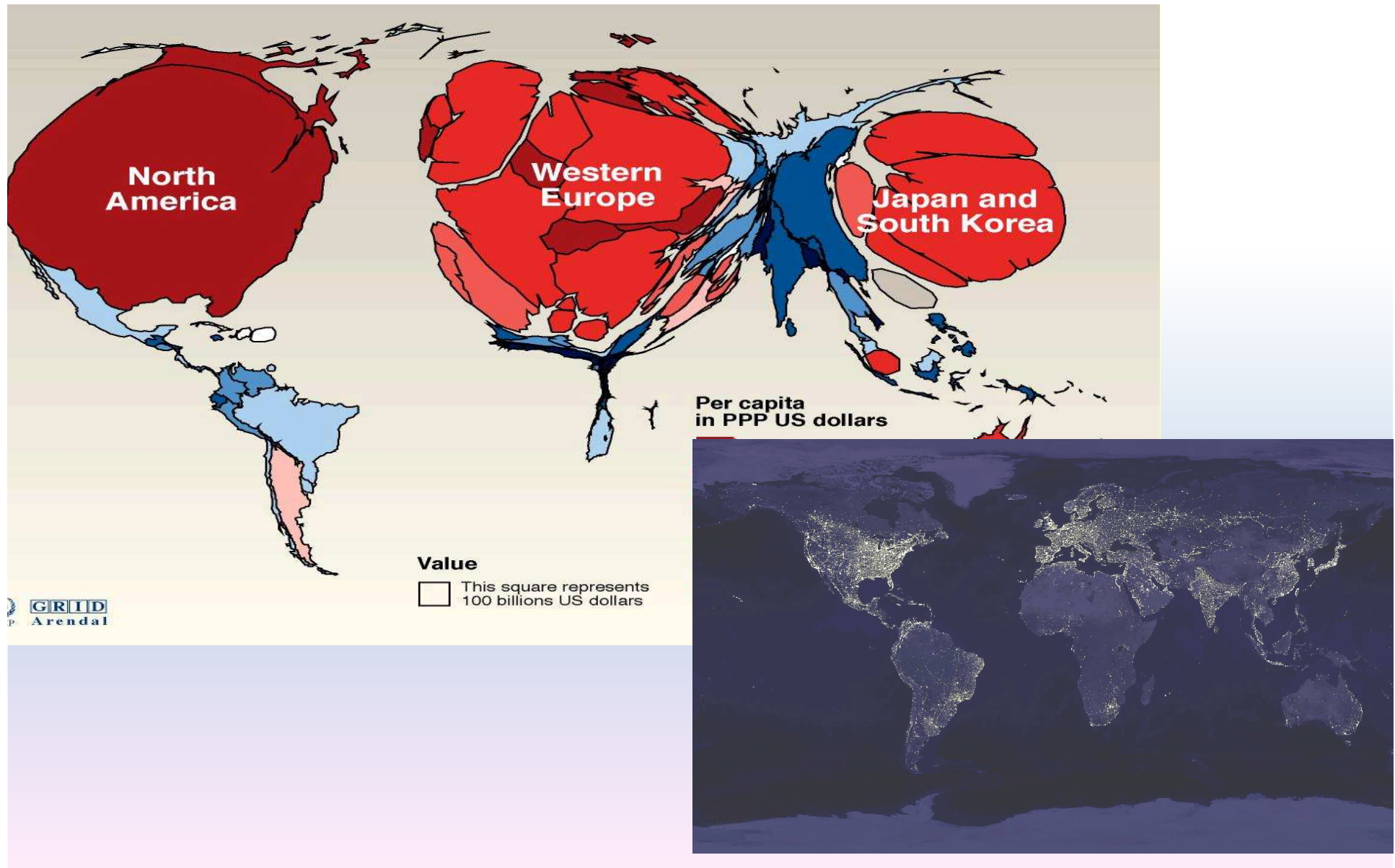


AREA => 8.514.876 km²

GNP 2010 (current value) => US\$ 2,088 billion

GNP PER CAPITA 2010 (current value) => US\$ 10,700

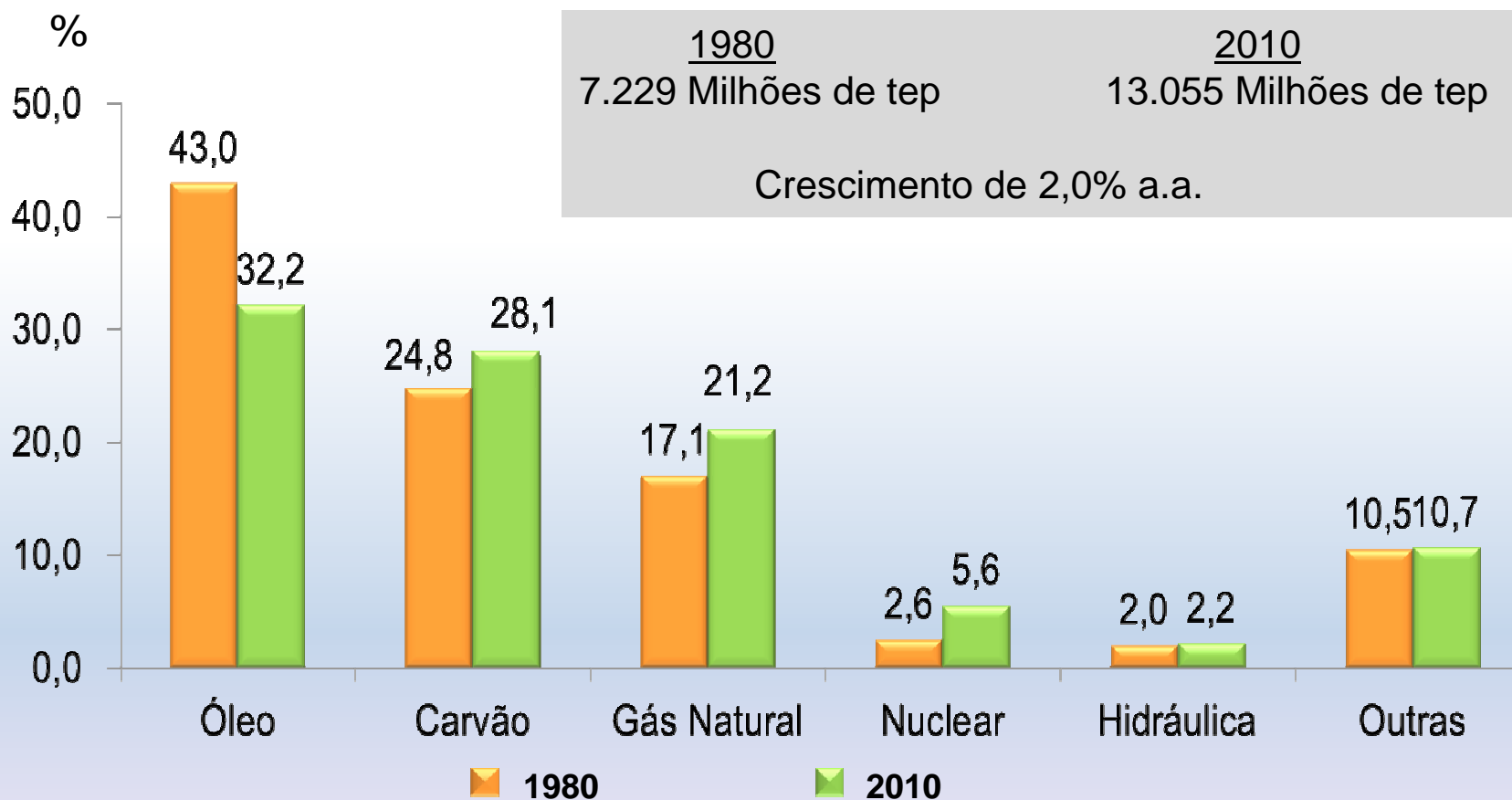
Gross Domestic Product and the Wealth of Nations



Evolution of Primary Energy Production and Final Energy Consumption by Source



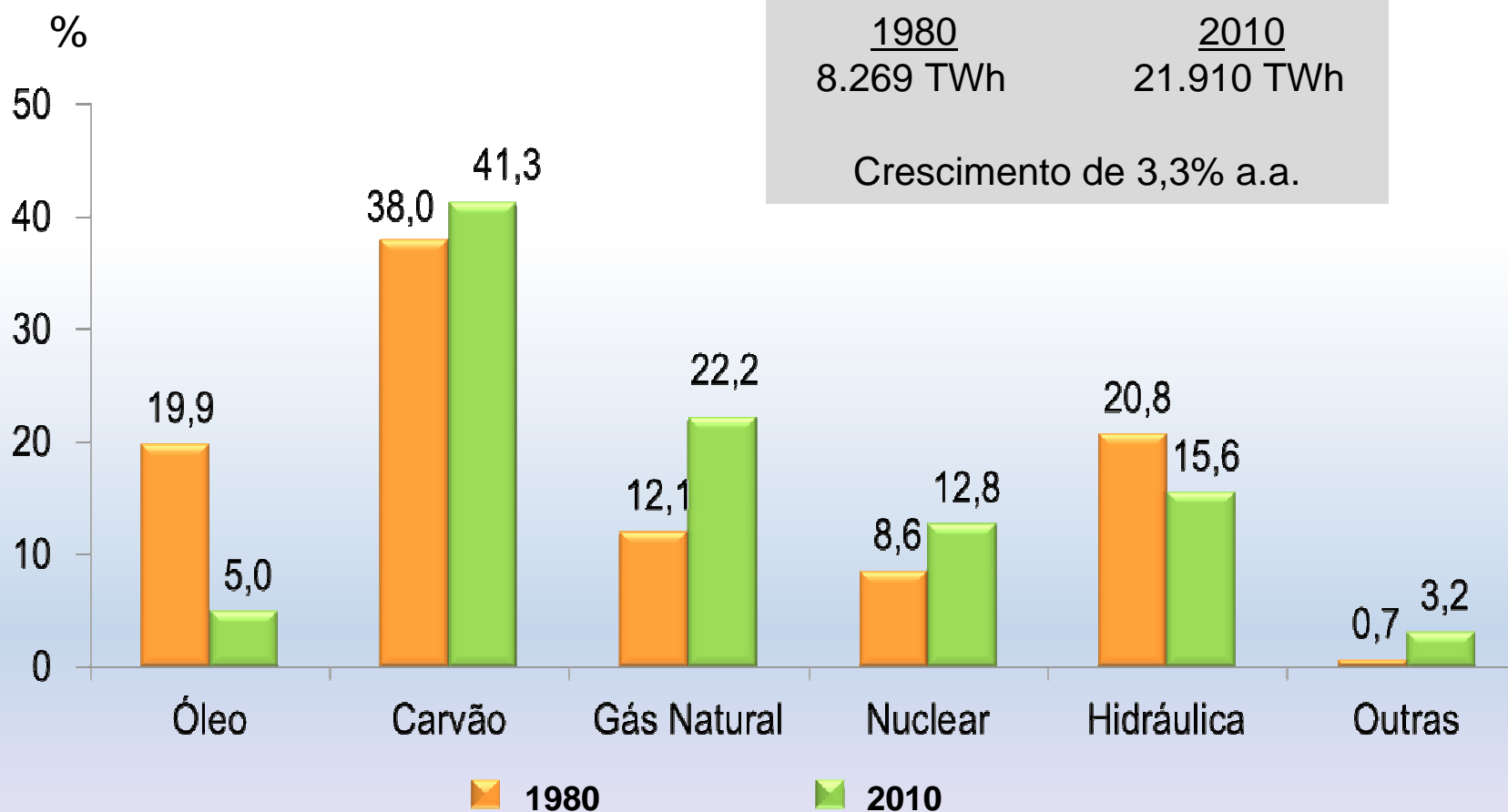
World Energy Matrix (%)



Participação de Combustíveis Fósseis:

1980 - 85% 2010 - 82%

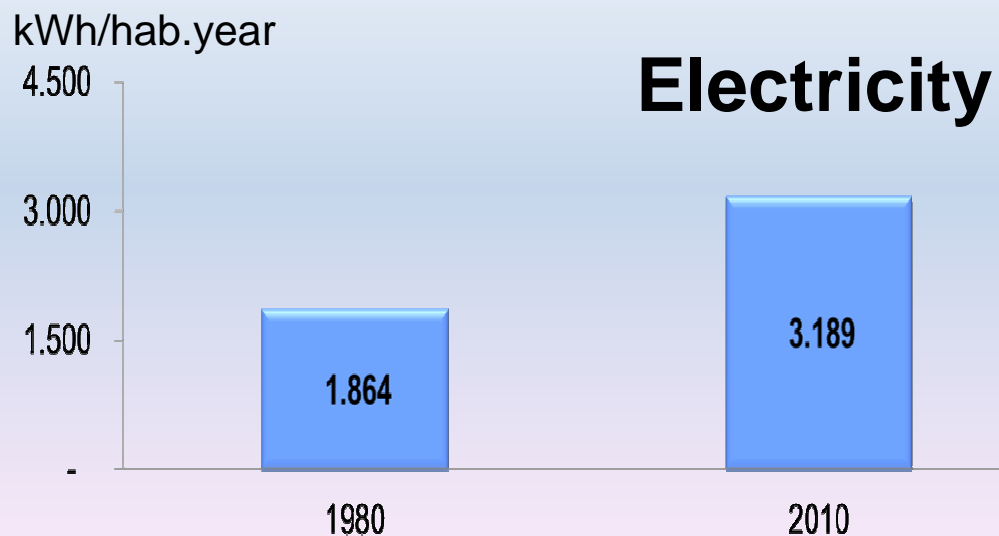
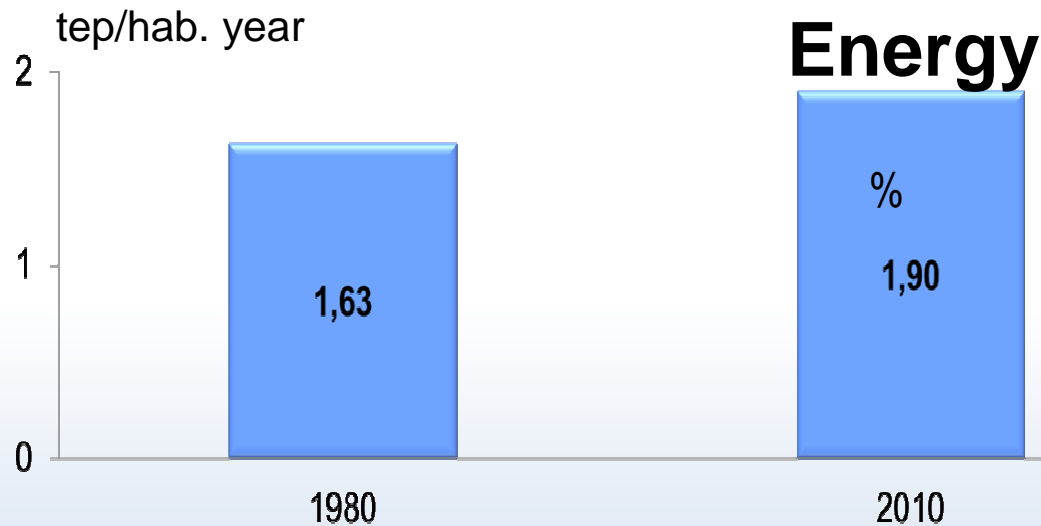
World Electric Energy Matrix (%)



Participação de Combustíveis Fósseis:

1980 - 70% 2010 - 69%

WORLD - ENERGY SUPPLY (per capita)



WORLD RANKING ENERGY SUPPLY BY COUNTRY / 2008

USA	18,6
China	17.4
Russia	5,6
India	5,1
Japan	4,0
Germany	2,7
Canada	2,2
France	2,2
Brazil	2,0
South Korea	1,8
Total	59,4

World Energy Outlook towards 2030

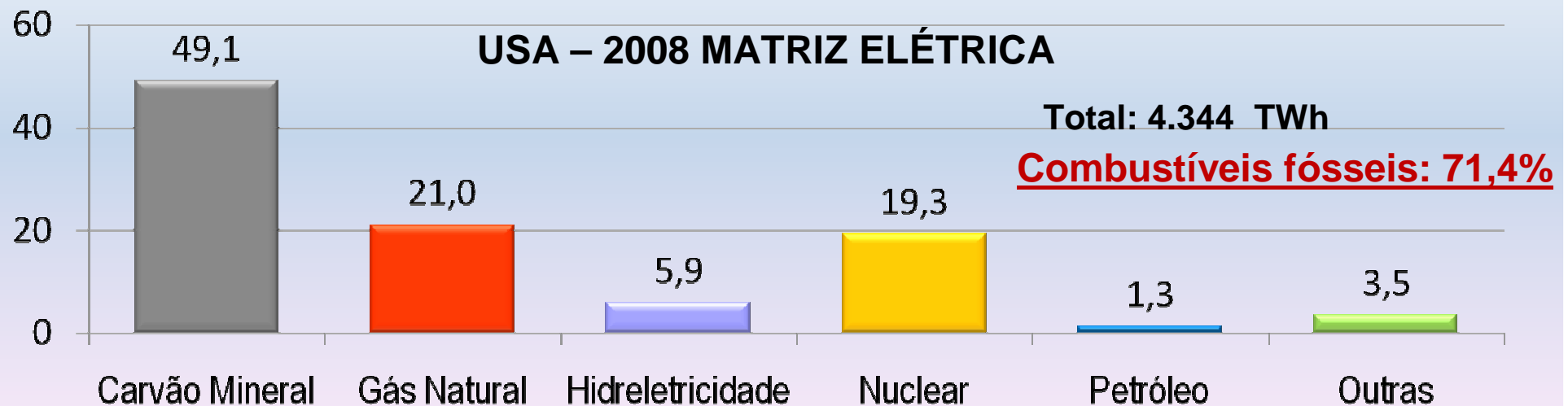
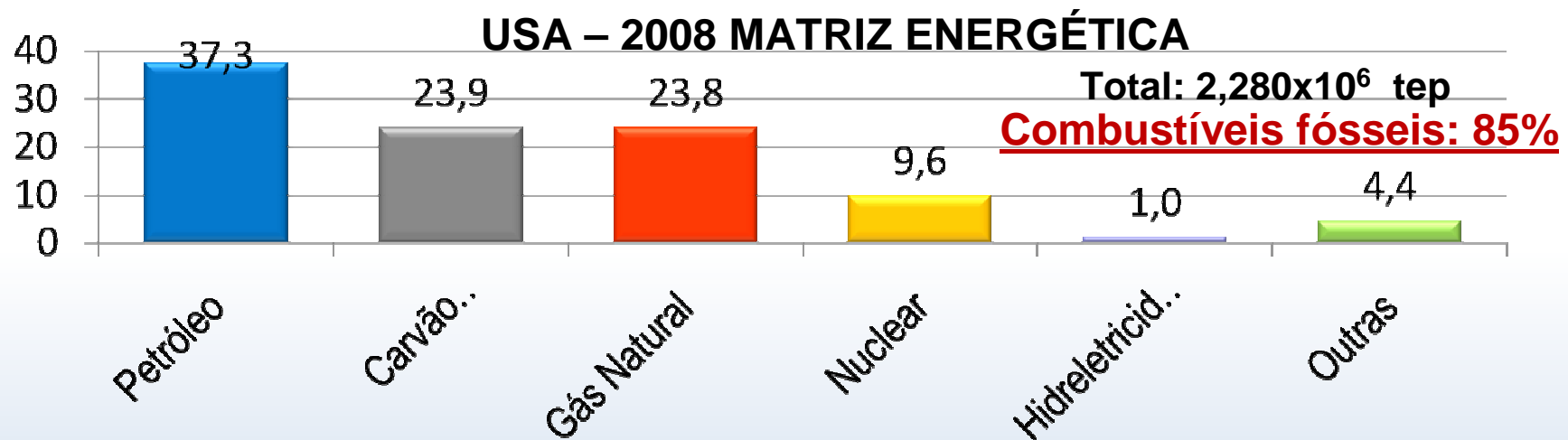
Energy Demand

- 2010/2030 growth rate 1,5% per year
- Fossil fuel share of 80%, by 2030 (82% in 2010)
- participação das fontes renováveis evolui de 13% para 15%

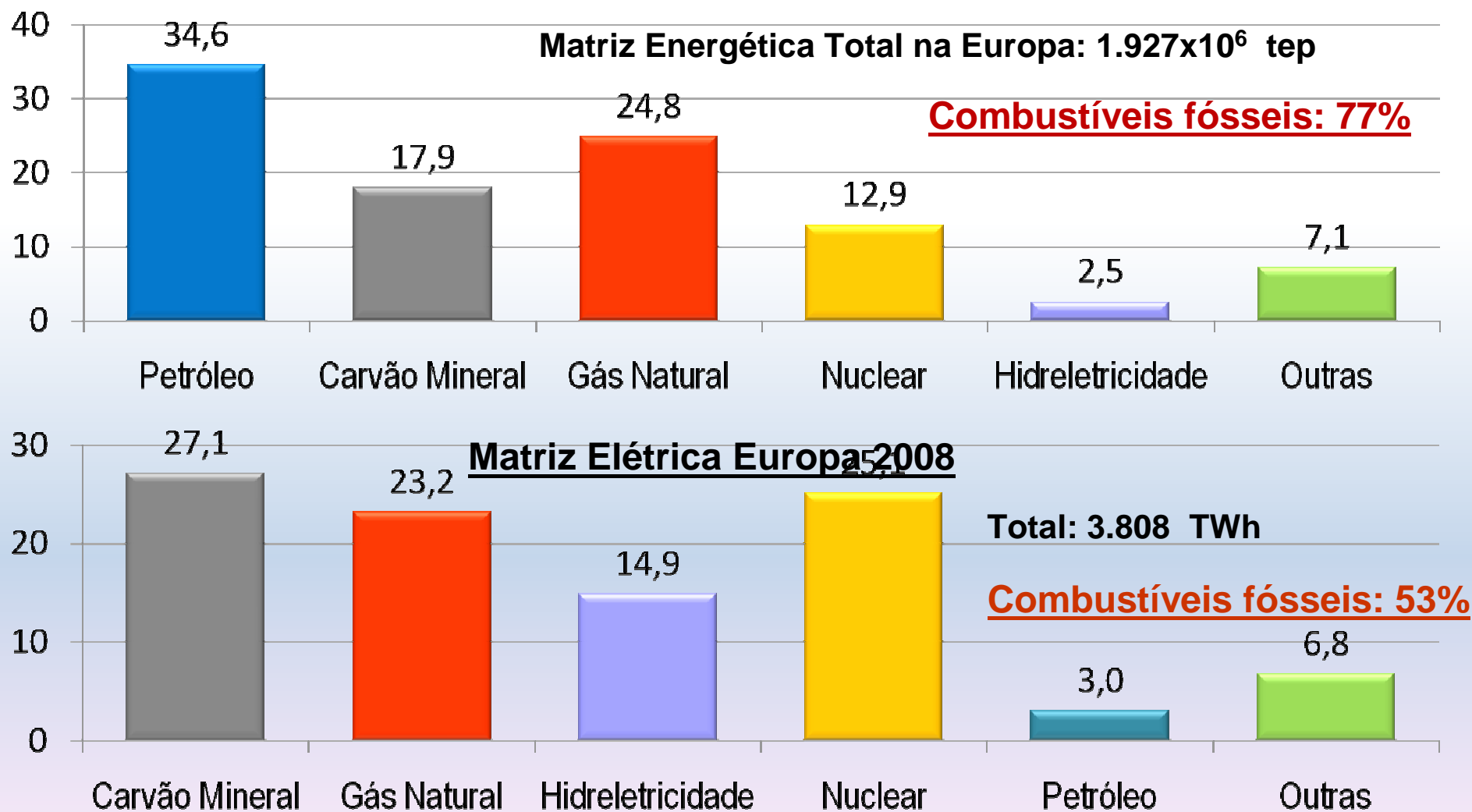
Energy Supply

- 2010/2030 growth rate 2,2% per year
- Fossil fuel share 65%
- Renewables from 19% in 2010 to 22% in 2030

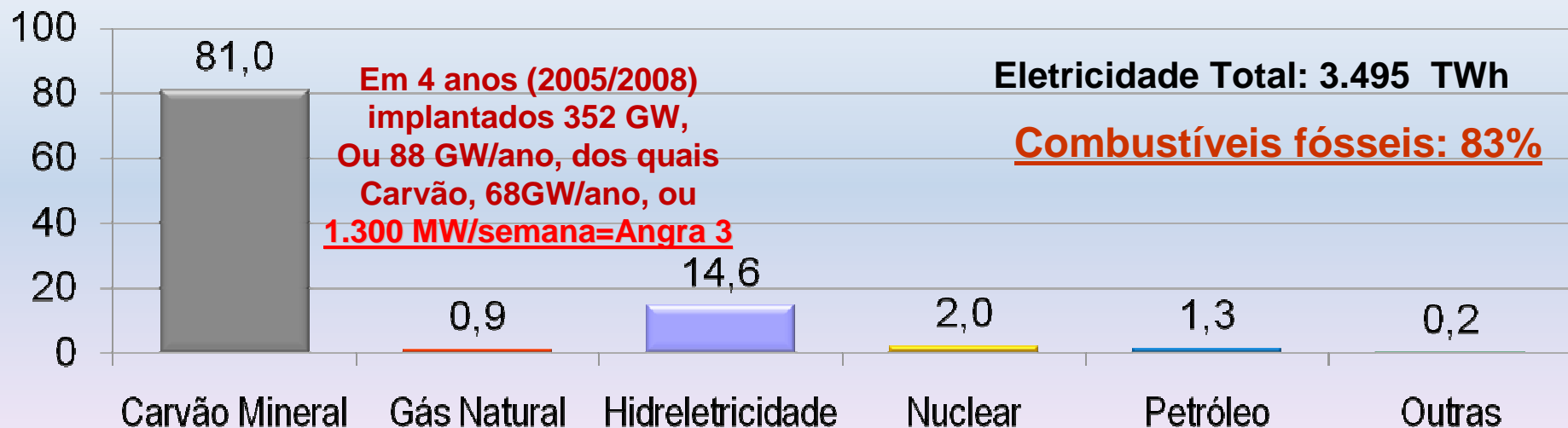
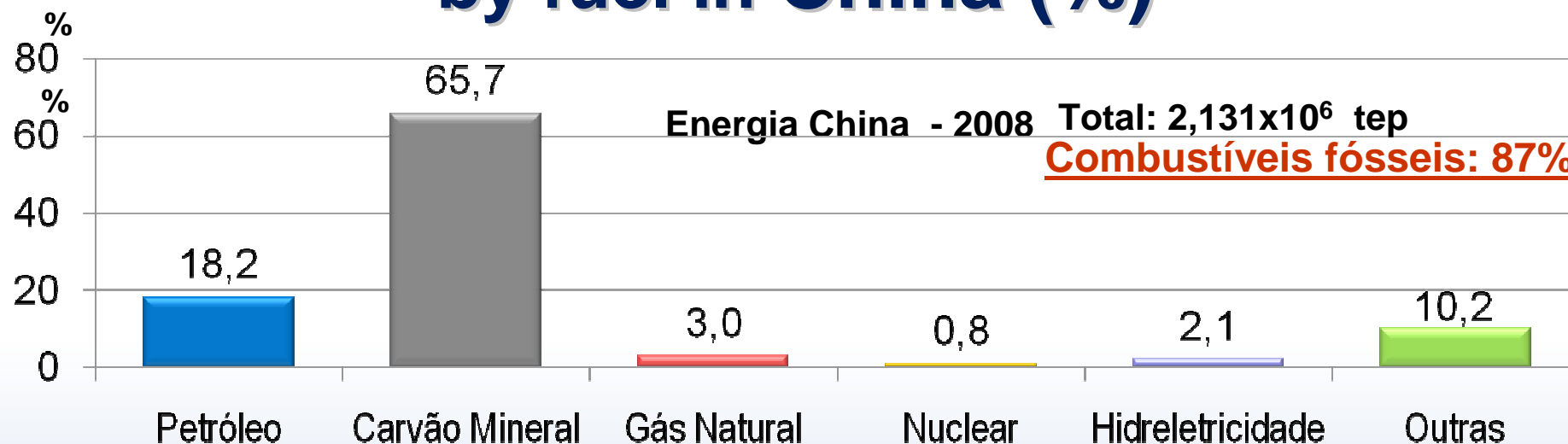
Energy Production and Electricity Generation by fuel in USA (%)



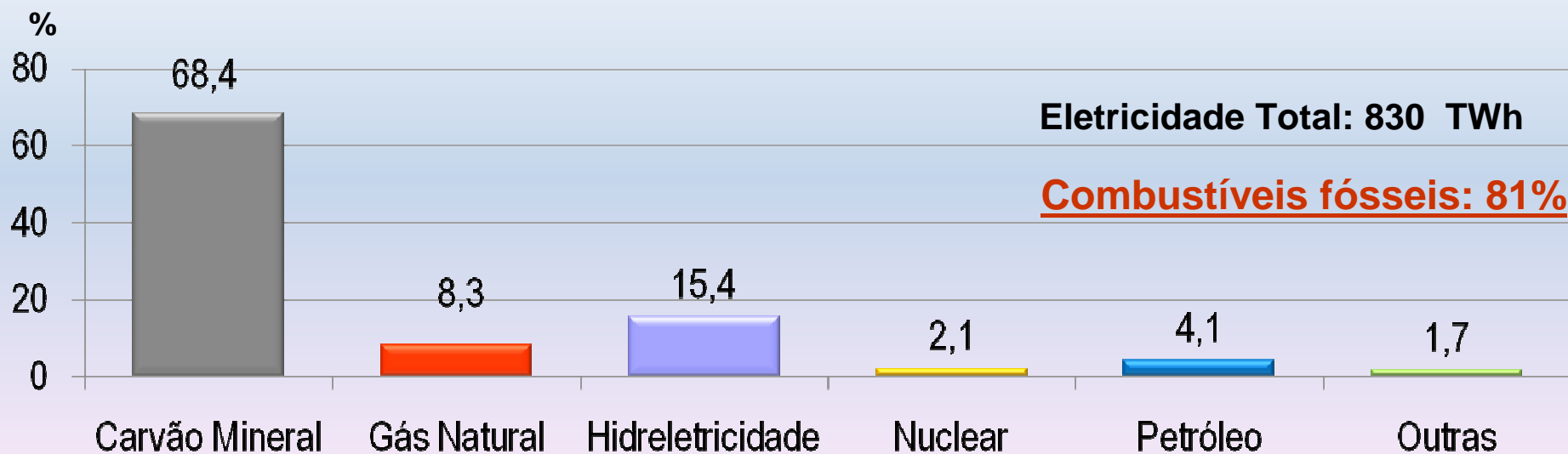
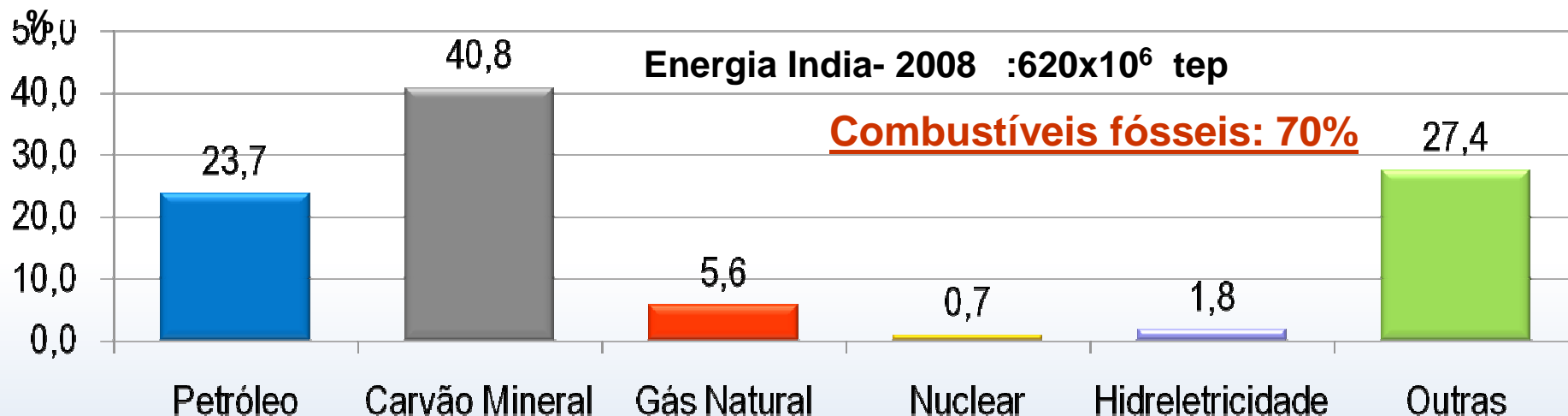
Energy Production and Electricity Generation by fuel in Europe (%)



Energy Production and Electricity Generation by fuel in China (%)

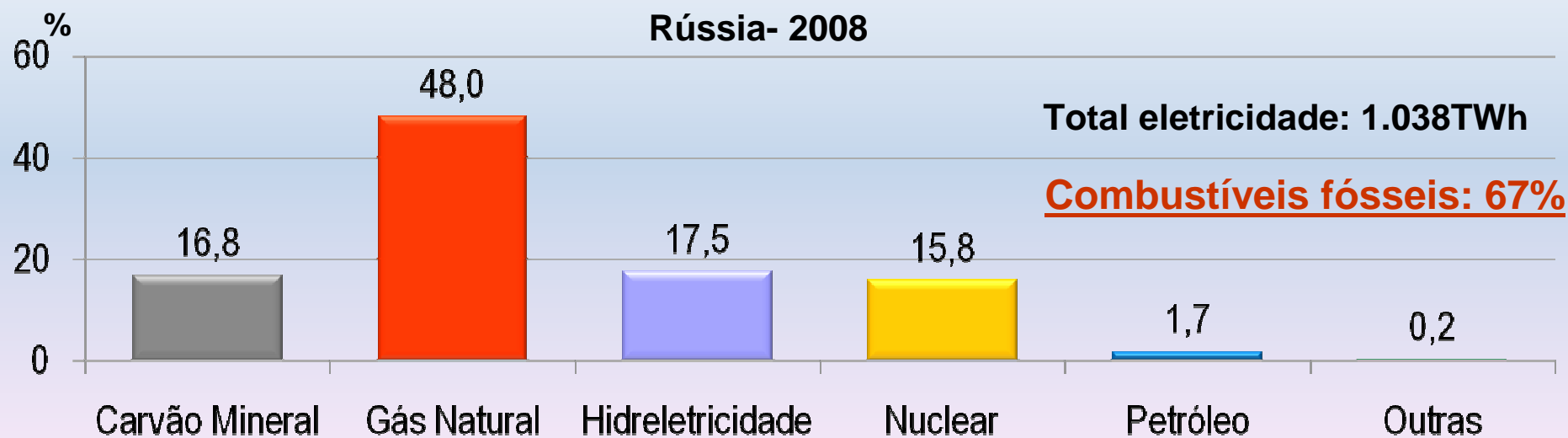
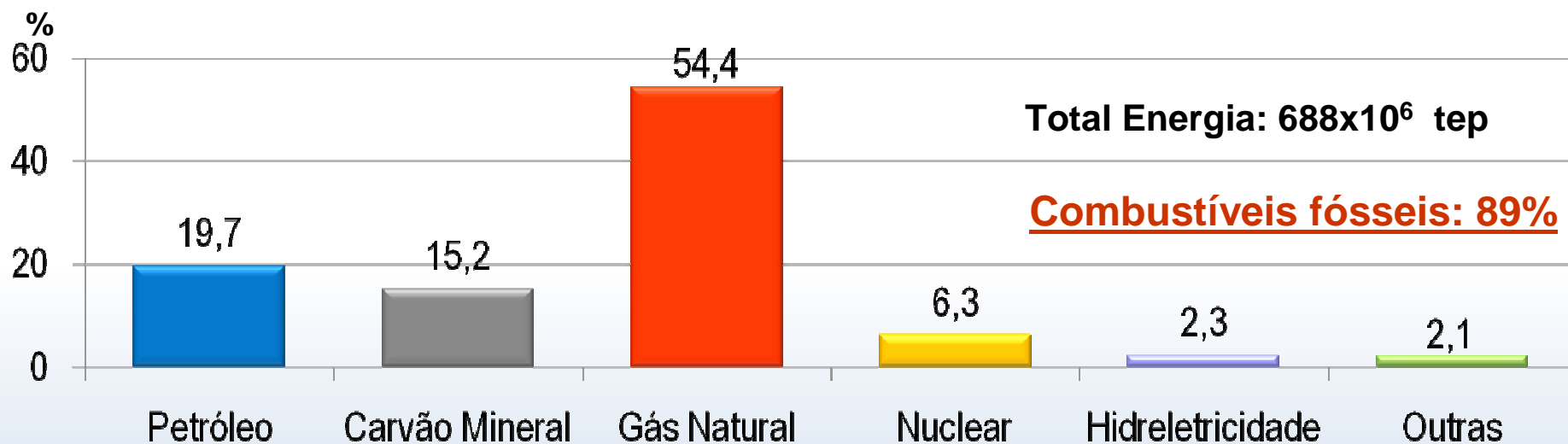


Energy Production and Electricity Generation by fuel in India (%)



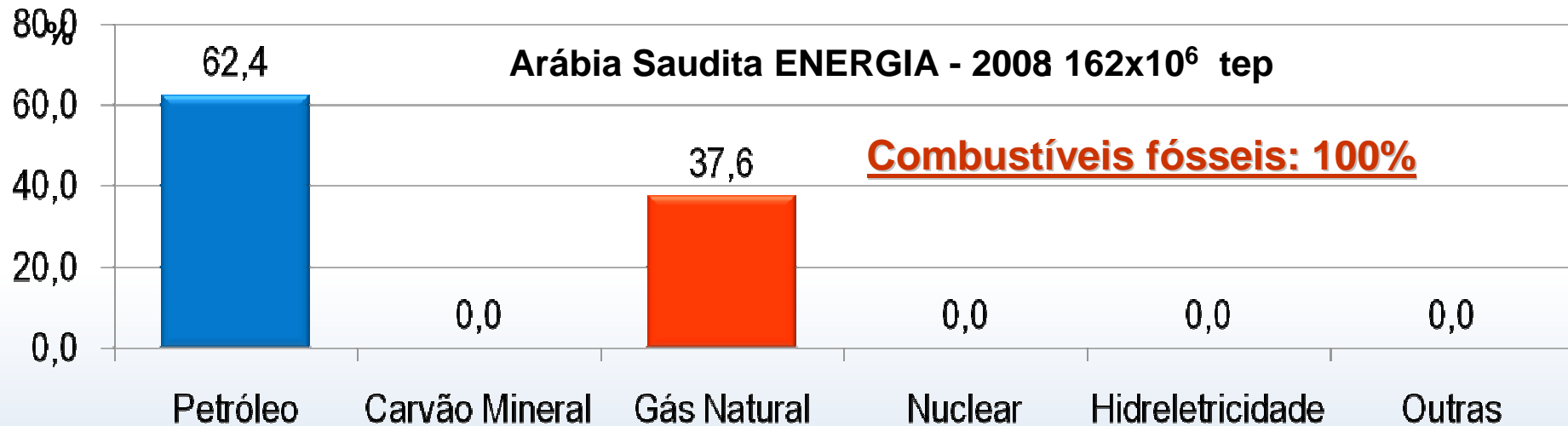
Fonte: IEA e MME/ BEN (2008)

Energy Production and Electricity Generation by fuel in Russia (%)

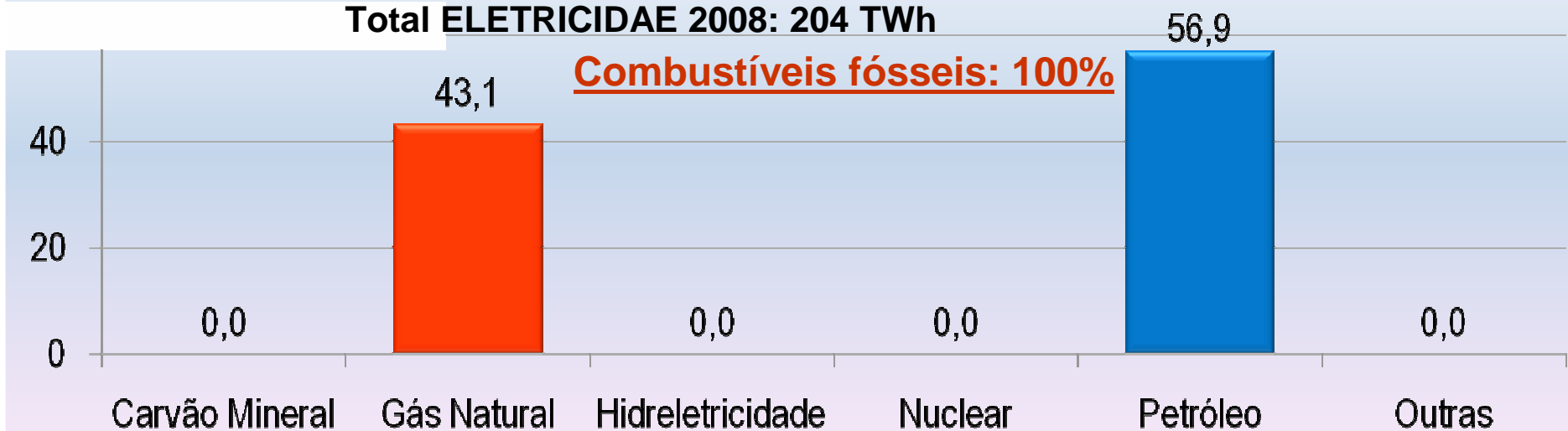


Fonte: IEA e MME/ BEN (2008)

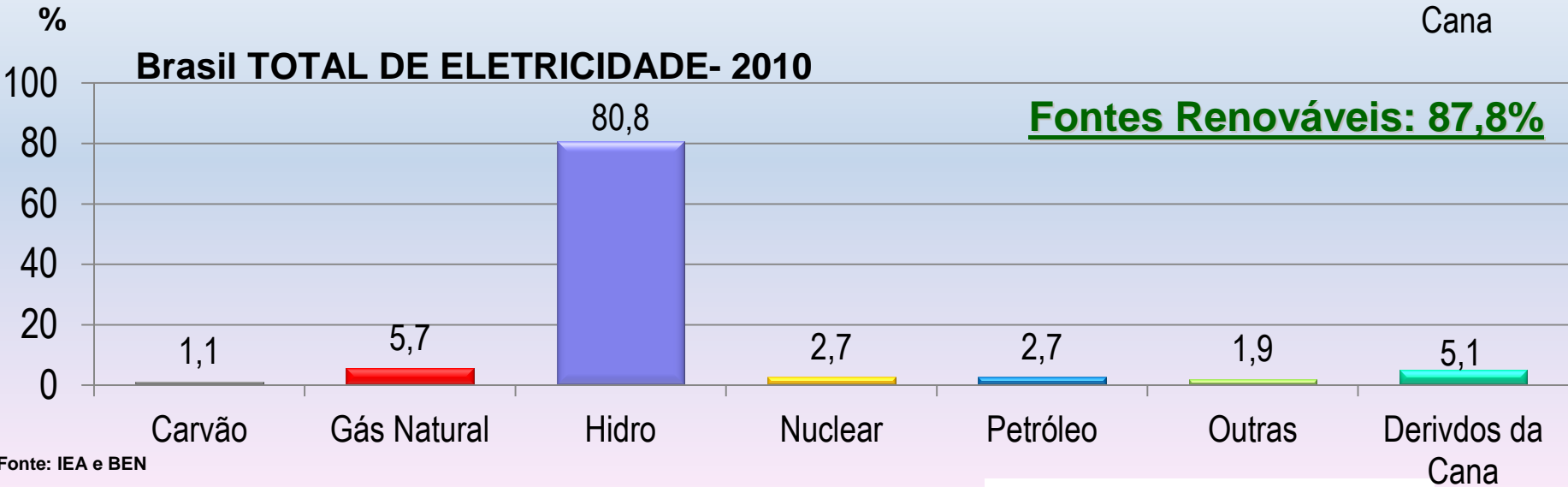
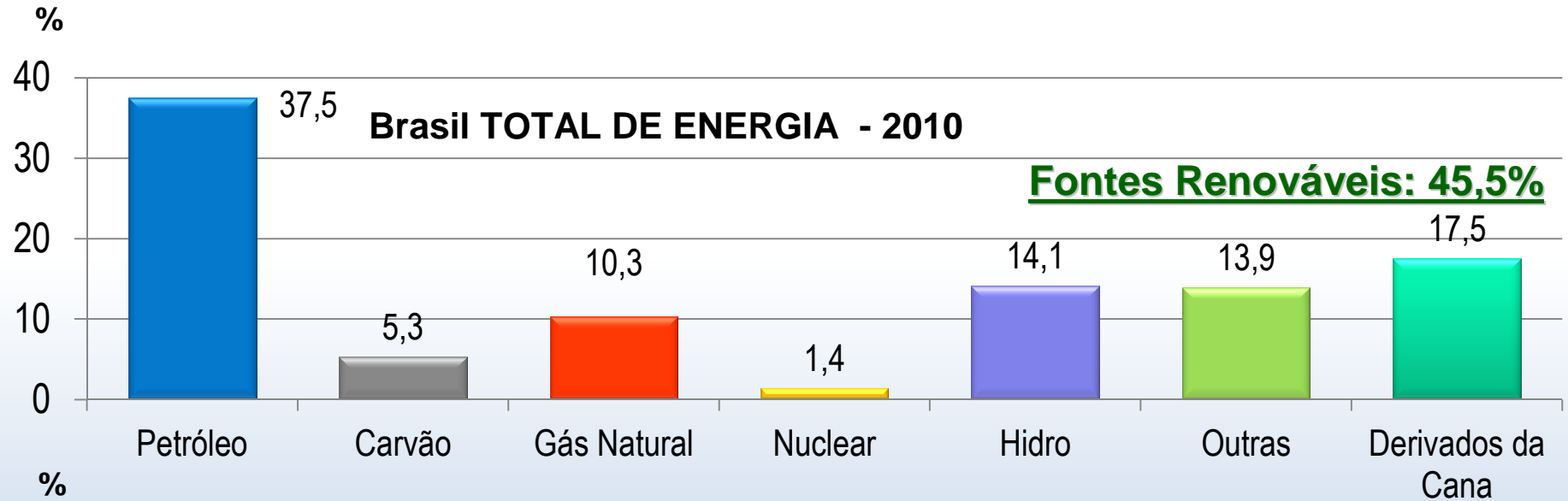
Energy Production and Electricity Generation by fuel in Saudi Arabia (%)



Total ELETRICIDADE 2008: 204 TWh



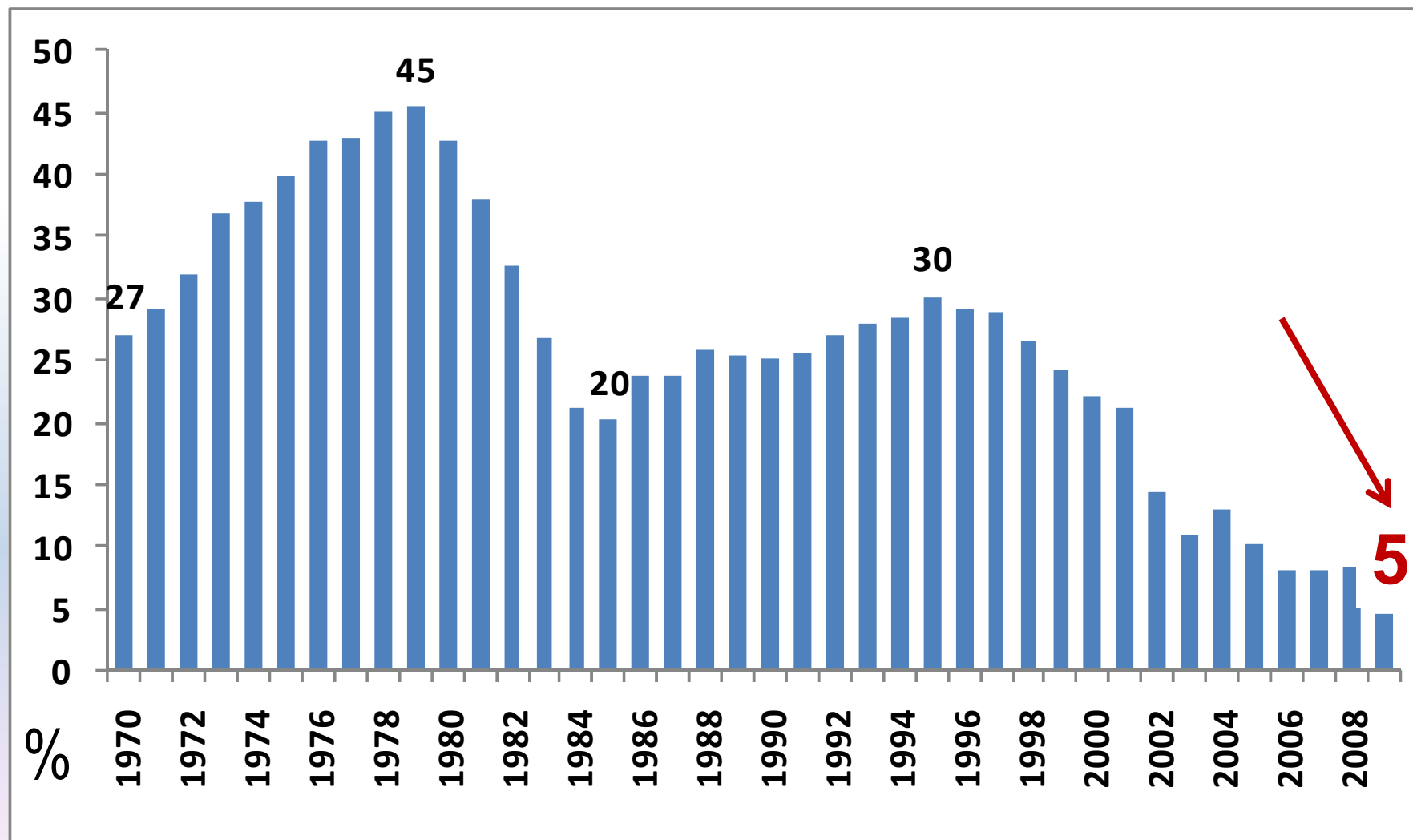
Energy Production and Electricity Generation by fuel in Brazil (%)



Fonte: IEA e BEN

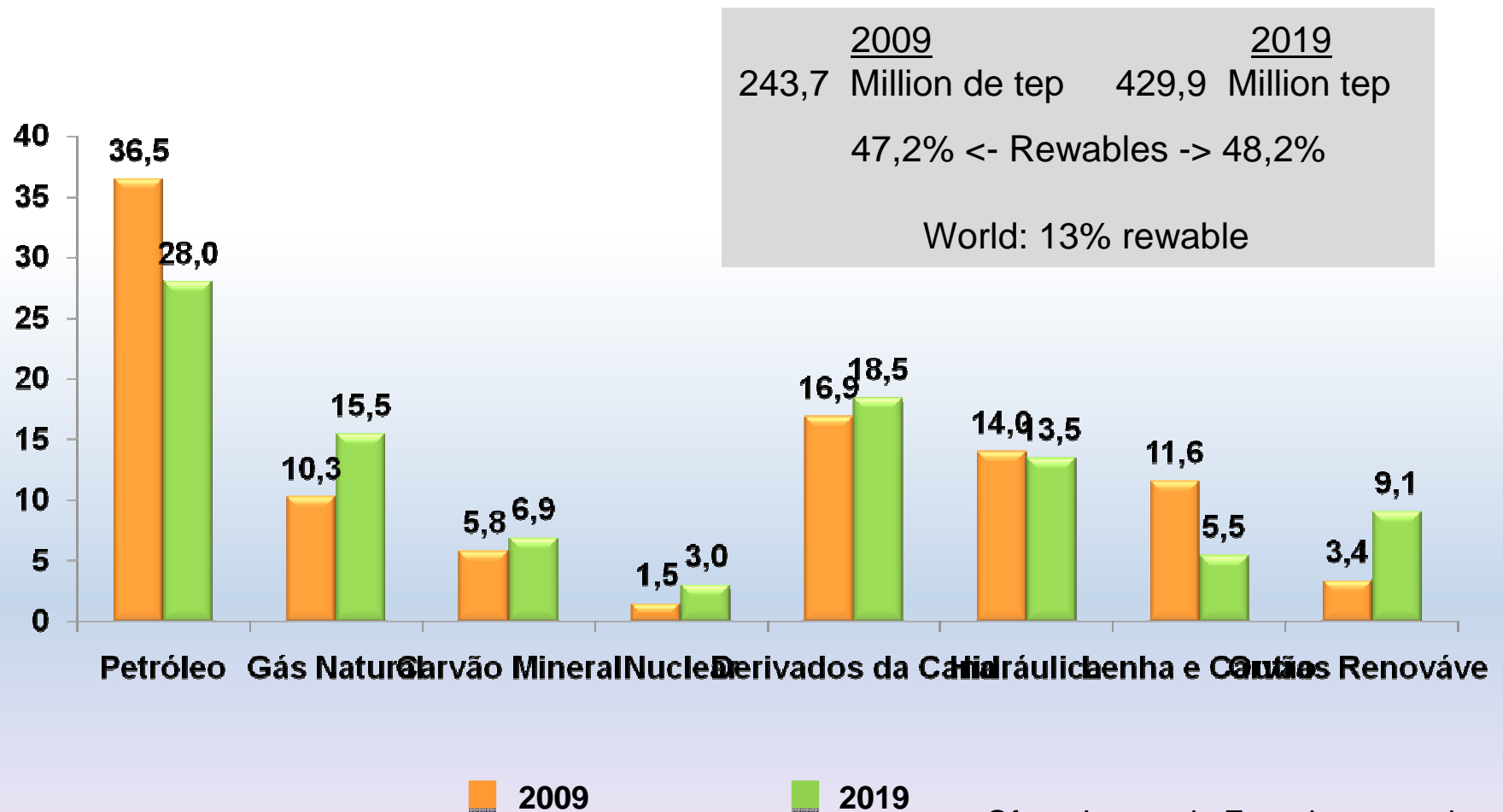
SELF-SUFFICIENCY / IMPORTS and EXPORTS

Percentage of Dependence in Relation to Domestic Energy Supply (%)



THE BRAZILIAN ENERGY PLANNING

DOMESTIC ENERGY SUPPLY



Oferta Interna de Energia per capita evolui de 1,40 para 2,14 tep/hab.ano

BRAZIL - ENERGY SYSTEM EXPANSION

Main Results

▪ Electric Power

Installed Capacity from 110 GW (70% hydro), in 2009, to 180 GW (67% hydro), in 2019; In 2019, natural gas natural 10%, biomasse 9%, oil 7%, wind 3%, nuclear 2% e coal 2%.

▪ Petroil and Natural Gas

In 2019, 5,1 million bbl/day (10% annual growth rate), 2,2 milion bbl/day for exportation; Natural gas nacional production, in 2019, 230 million m³/day (14% annual growth rate) and 40 million m³/day for export

▪ Biofuel

Ethanol – 64 milhões m³, in 2019, and exports of 10 milhões de m³ (in 2009, 26,1 million m³, in 2009).

Biodiesel – 4,2 million m³, in 2019, (1,6 milhões m³, in 2009).

EVOLUTION OF "HYDROELECTRIC CULTURE"

Run of River Hydroelectric Power Plant



USINA DE IGARAPAVA - CEMIG

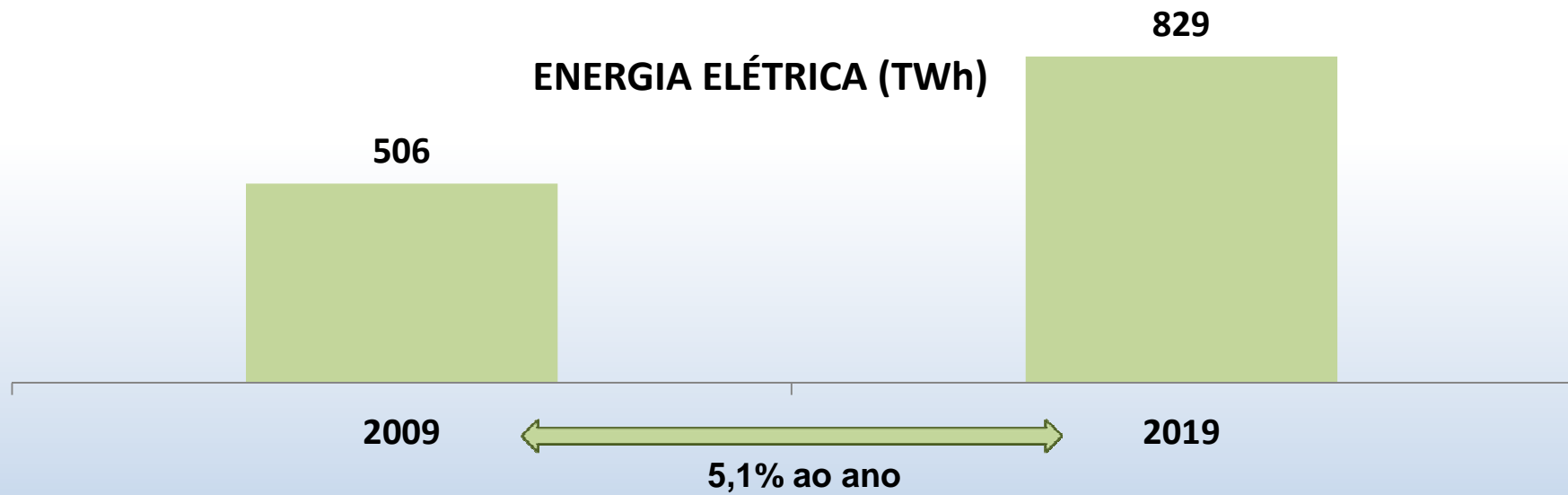


Many Thaks

Olga Simbalista

Rio de Janeiro, October 2011

BRAZIL - NATIONAL ELECTRICITY SUPPLY (%)

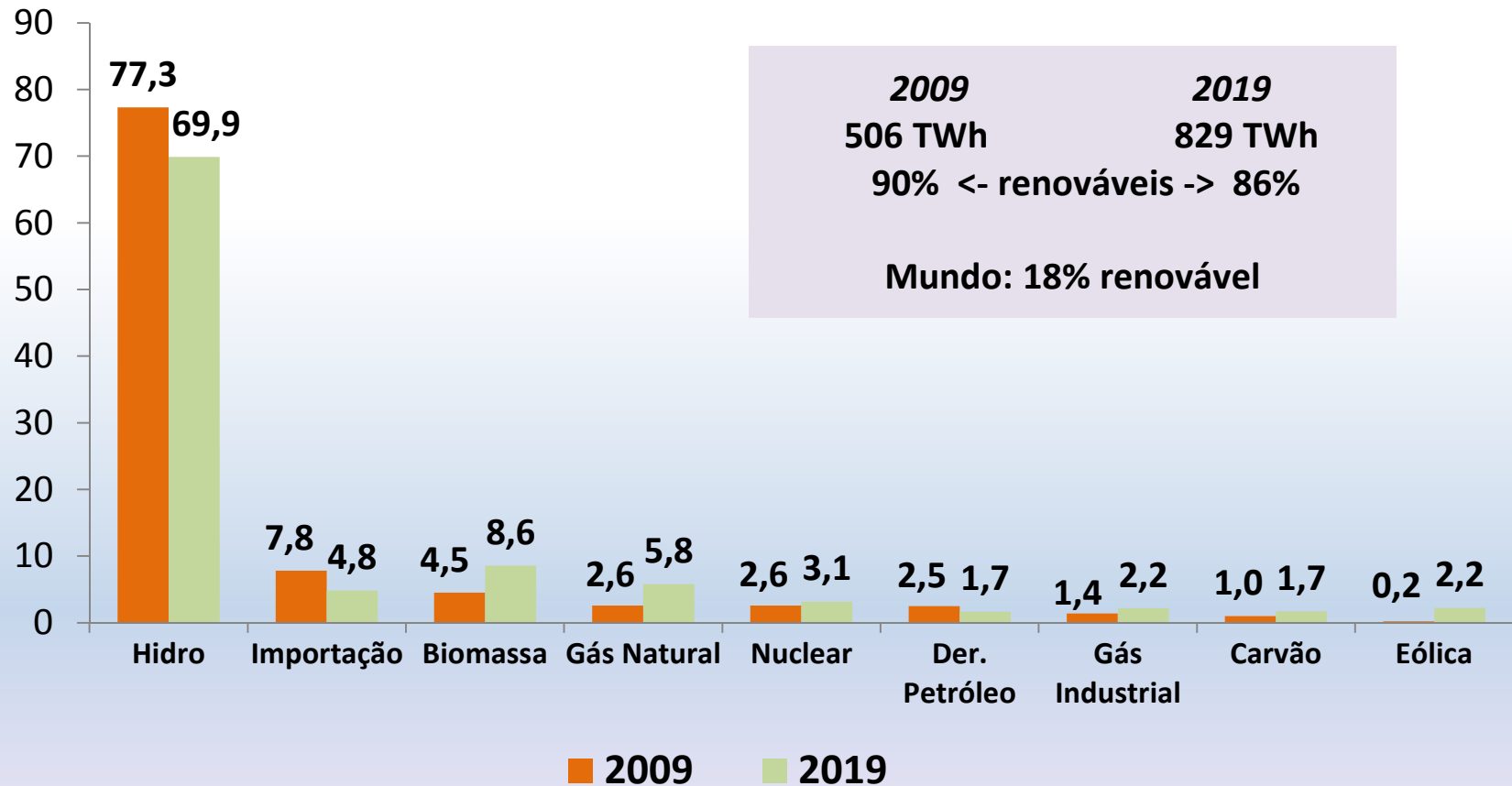


Ano	Consumo per Capita (kWh/hab.)
2009	2.231
2019	3.441

Evolução da Capacidade Instalada
 7.100 MW por ano no horizonte decenal (incluindo a autoprodução)

Fig18

BRAZIL - NATIONAL ELECTRICITY SUPPLY



Oferta Interna de Energia Elétrica per capita evolui de 2.650 para 4.000 kWh/hab.ano

Fig19

BRAZIL - HYDROELECTRICITY / Hydropower Plants in The Amazon Region

- Bacia do Madeira (6.450 MW) :
 - Jirau (3.300 MW) e Santo Antônio (3.150 MW) - suprimento 2012/2014

- Bacia do Xingu (11.233 MW) :
 - Belo Monte (11. 233 MW) - suprimento 2015/2017

- Bacia do Tapajós (26.494 MW) :
 - Baixo Tapajós: sete usinas (complexo São Luiz), totalizando 14.245 MW – suprimento 2017/2020;
 - Alto Tapajós : Teles Pires (cinco usinas, 3.644 MW) e Juruena (treze usinas, 8.605 MW), totalizando 12.249 MW - suprimento 2015/2018.

CHALLENGES OF ENERGY SYSTEM EXPANSION IN THE NEXT 10 YEARS

- Expansão de 71.000 MW (incluindo auto-produção) no horizonte decenal 2009/2019 (média anual de 7.100 MW)
- Elevação da atual produção nacional de petróleo de 2 milhões de bbl/dia para cerca de 5 milhões bbl/dia
- Elevação da atual produção nacional de gás natural de 60 milhões de m³/dia para cerca de 230 milhões de m³/dia
- Expandir a produção de biocombustíveis (etanol e biodiesel) à taxa de 10% ao ano

Investimentos em Energia		
	R\$ bilhões	%
Energia Elétrica	214	22,5
Petróleo e Gás	672	70,6
Biocombustíveis	66	6,9
Total dos Investimentos (*)	951	100,0

(*) Representa cerca de 2,2% do PIB e 10,1% da FBC

Fig22