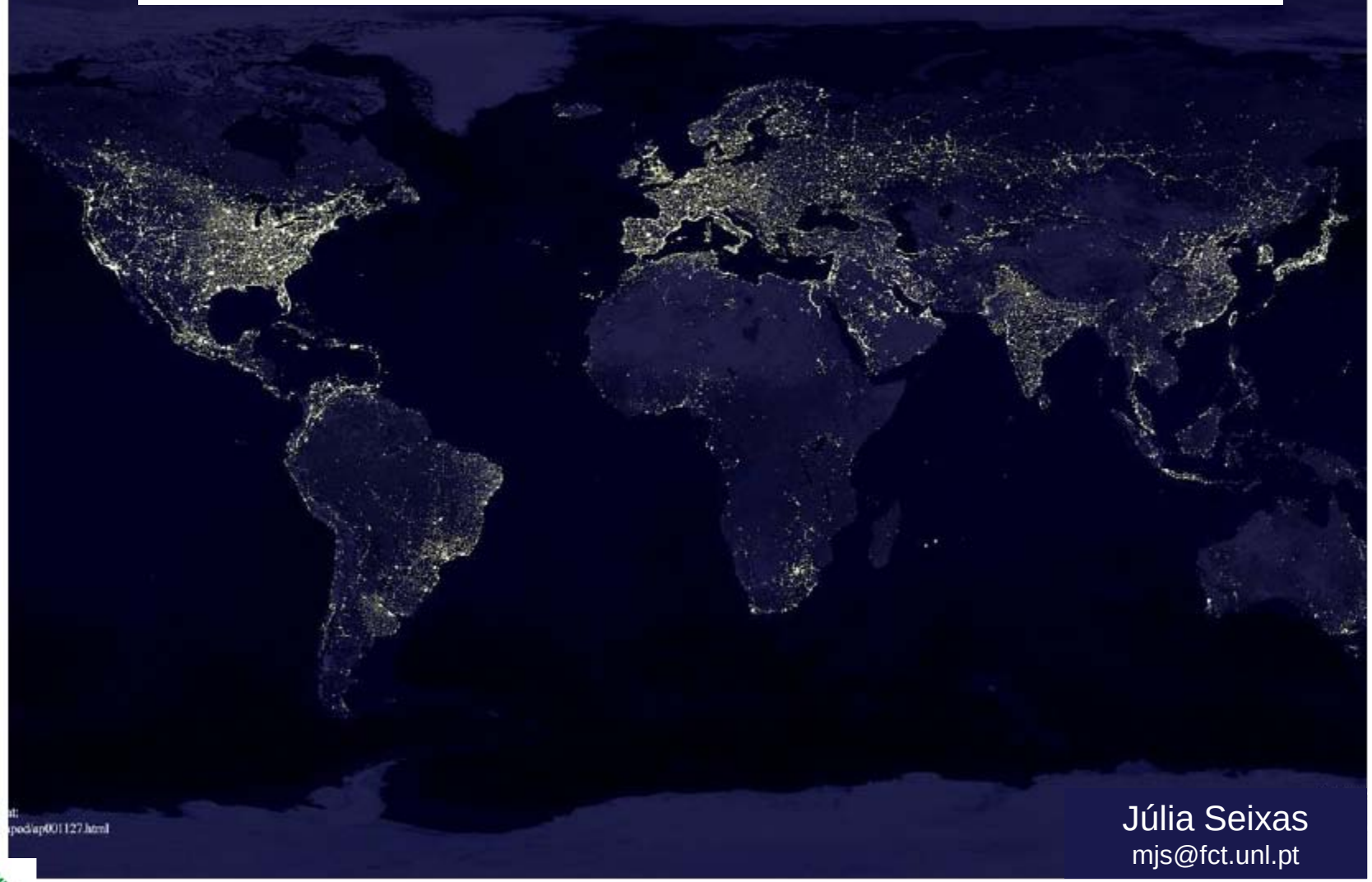
Alterações Climáticas
Pós Copenhaga



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Sumário

1. **Um passado pesado**
2. **Mitigação: do *Business as Usual* à super redução**
3. **Expectativas no Pós-Copenhaga**

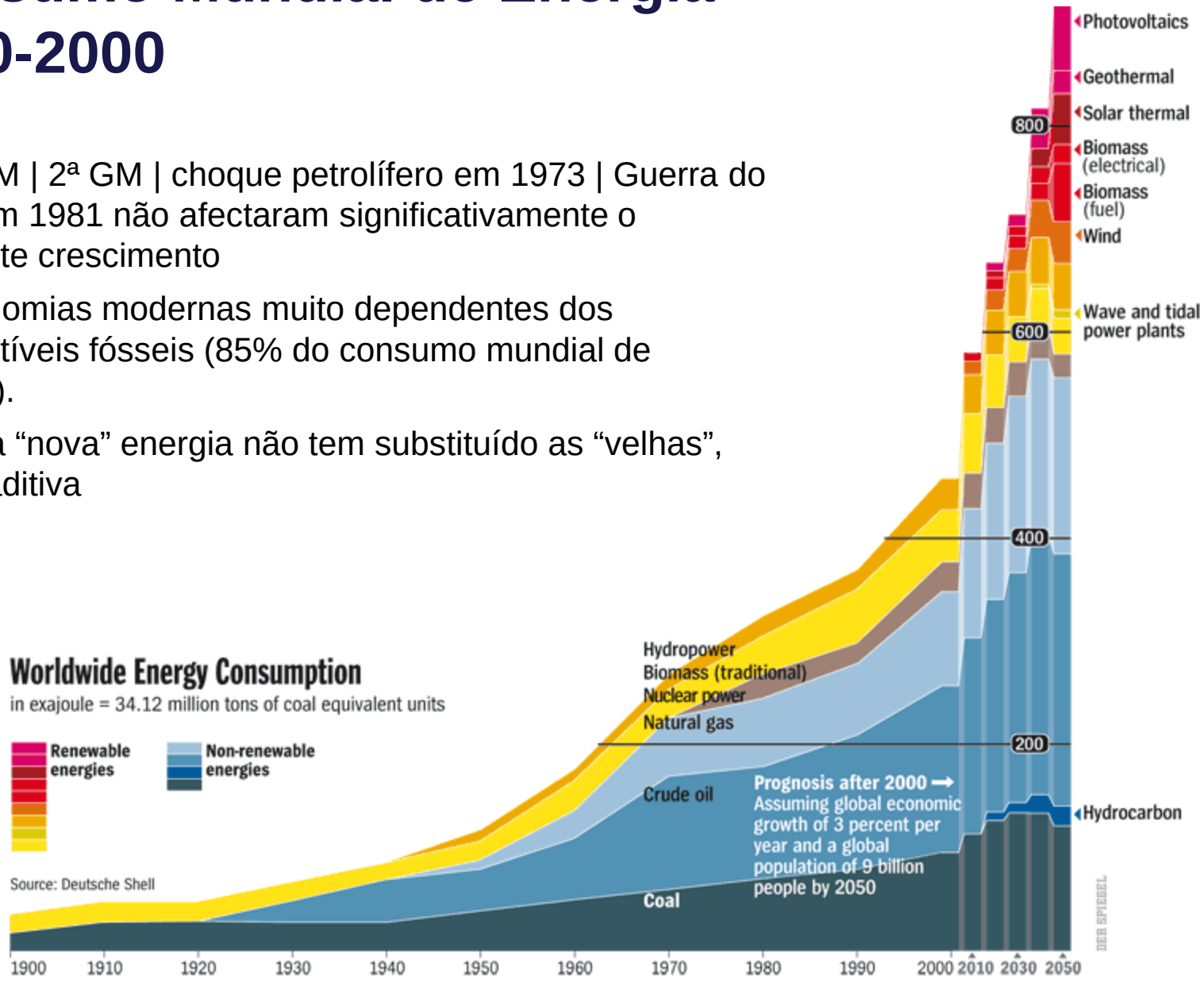
Sumário

Consumo Mundial de Energia 1860-2000

→ 1ª GM | 2ª GM | choque petrolífero em 1973 | Guerra do Golfo em 1981 não afectaram significativamente o constante crescimento

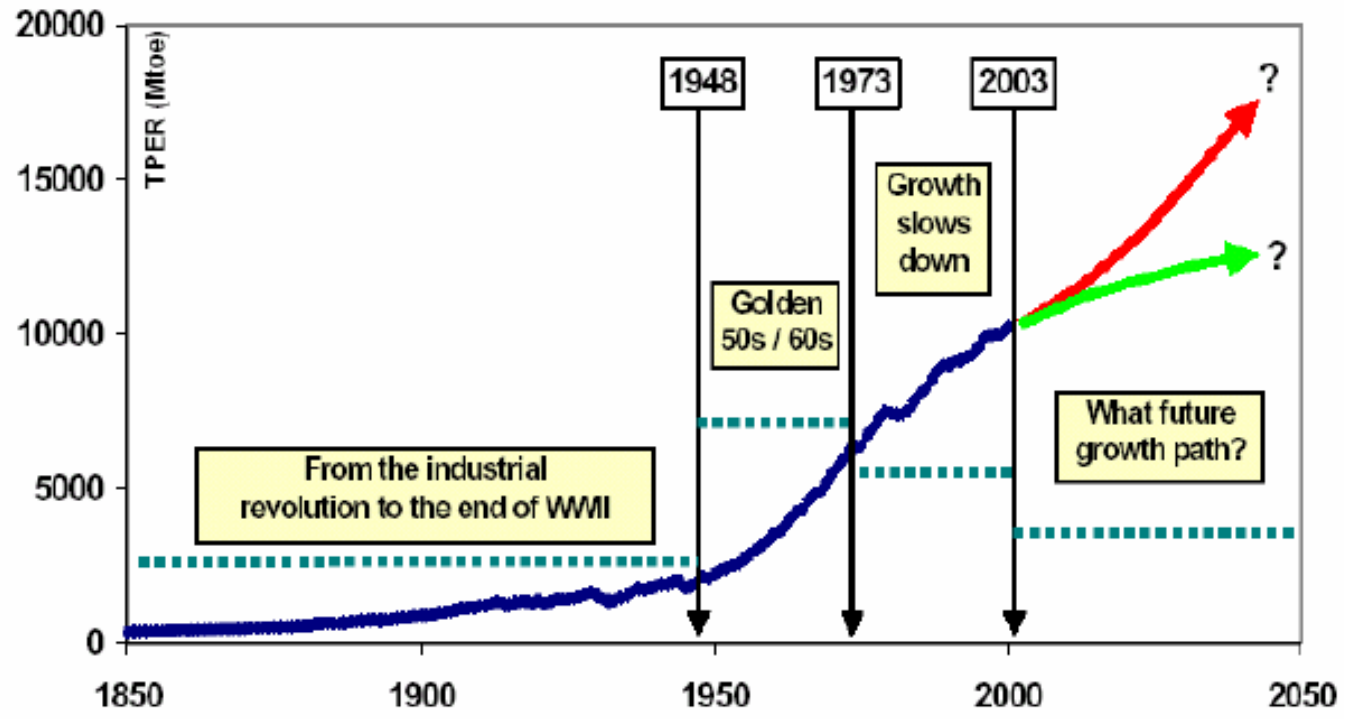
→ Economias modernas muito dependentes dos combustíveis fósseis (85% do consumo mundial de energia).

→ Cada "nova" energia não tem substituído as "velhas", mas é aditiva



Fonte: Deutsche Shell

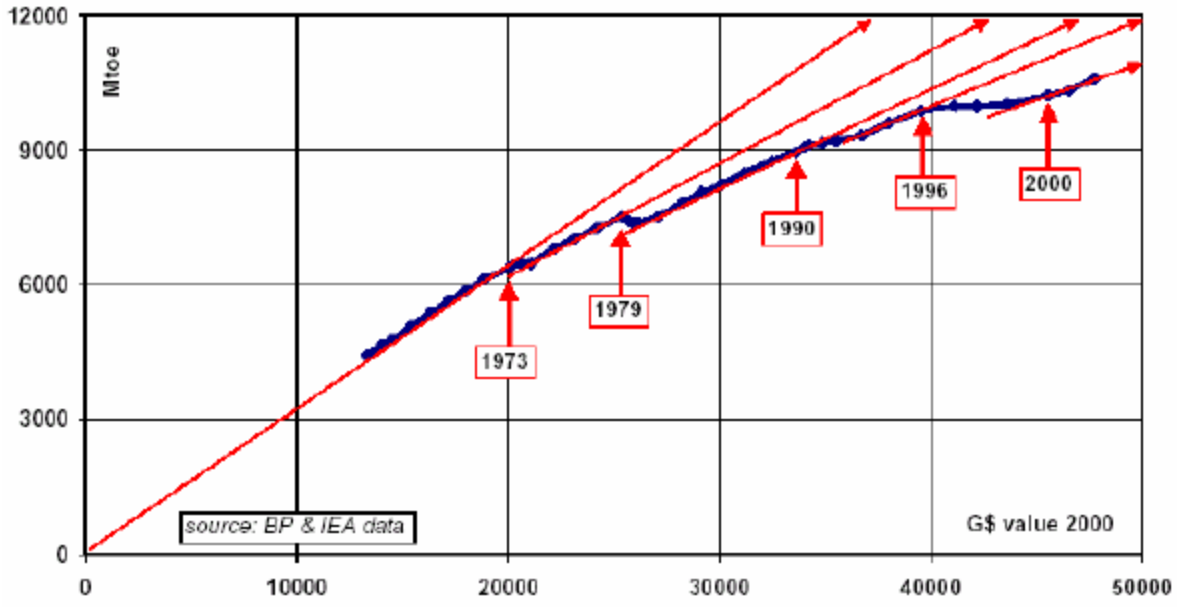
Energy demand and GDP
(over time)



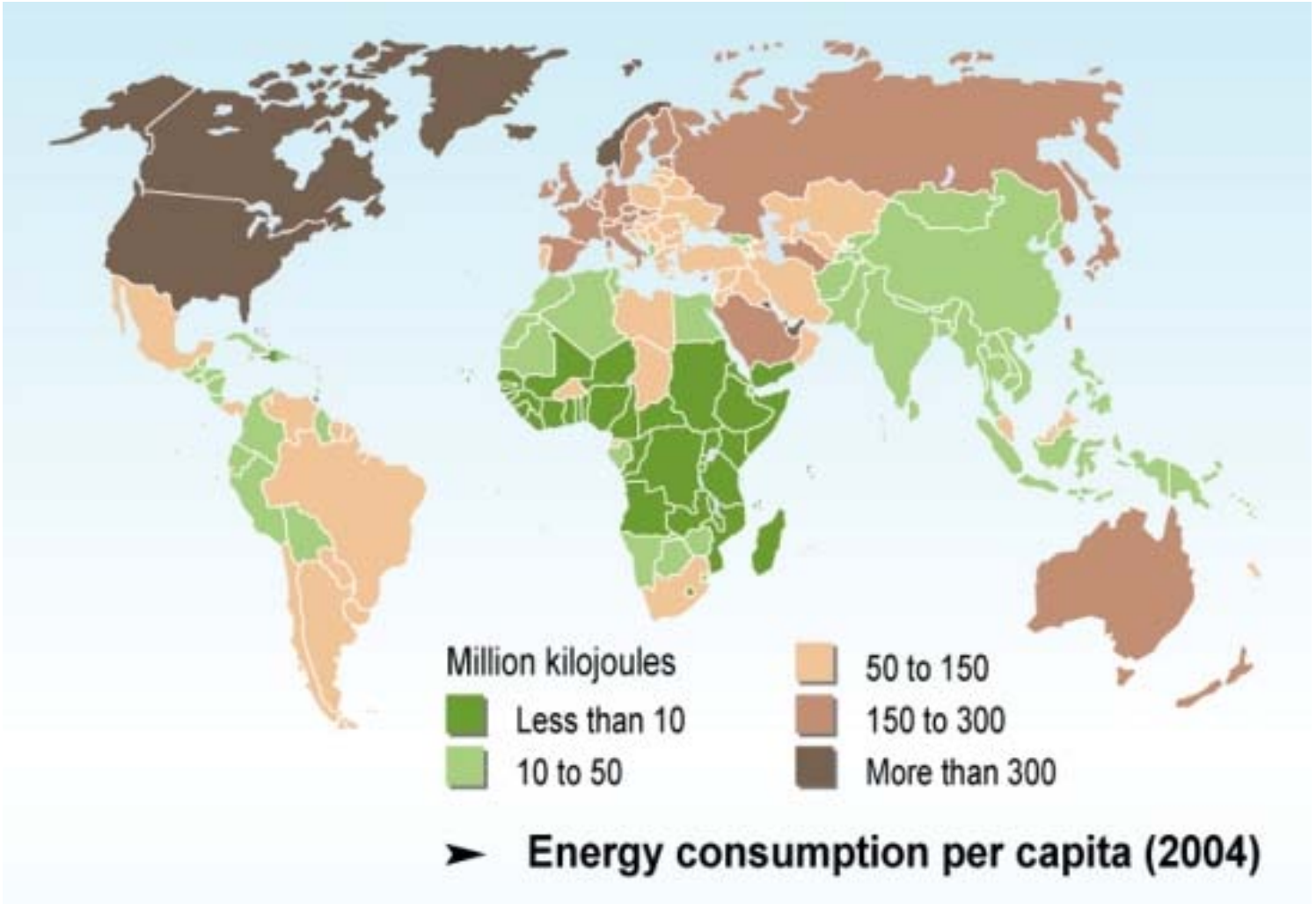
Source: *Drivers of the Energy Scene*, World Energy Council (2003)

TPER, Total Primary Energy Requirement

World TPES vs. GDP, 1965-2002



Source: *Drivers of the Energy Scene*, World Energy Council (2003)
(TPES – Total primary Energy Supply)



Somewhere in Southern Europe

Somewhere in central Europe

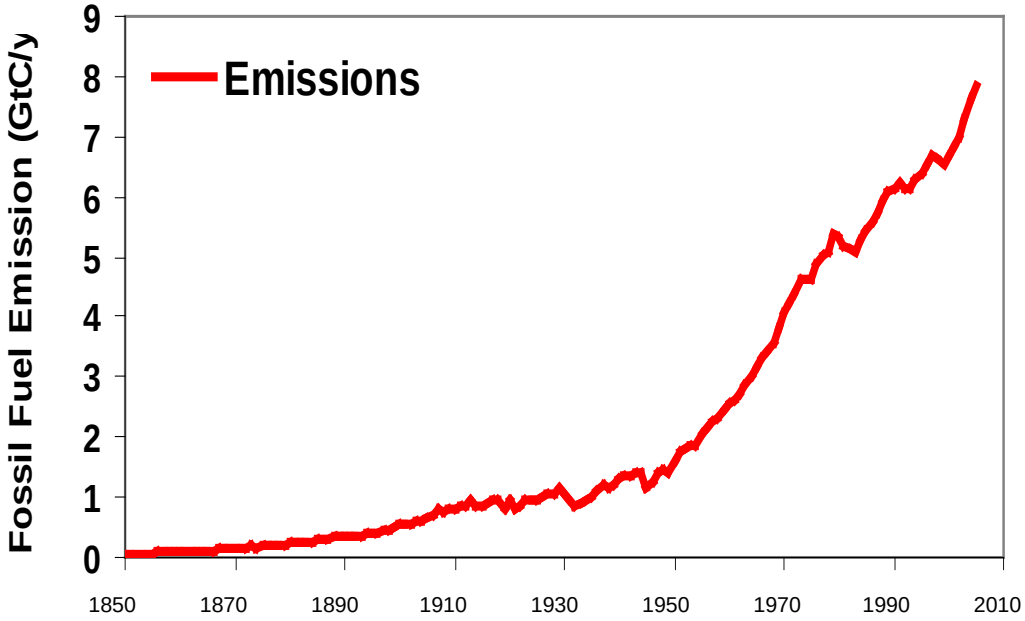
OECD countries

Darfur region of Sudan, 2004

Emissões Carbono 1860-2007

86% OF CAR JOURNEYS TO WORK ARE DRIVER ONLY

2007 Fossil Fuel: 8.5 Pg C



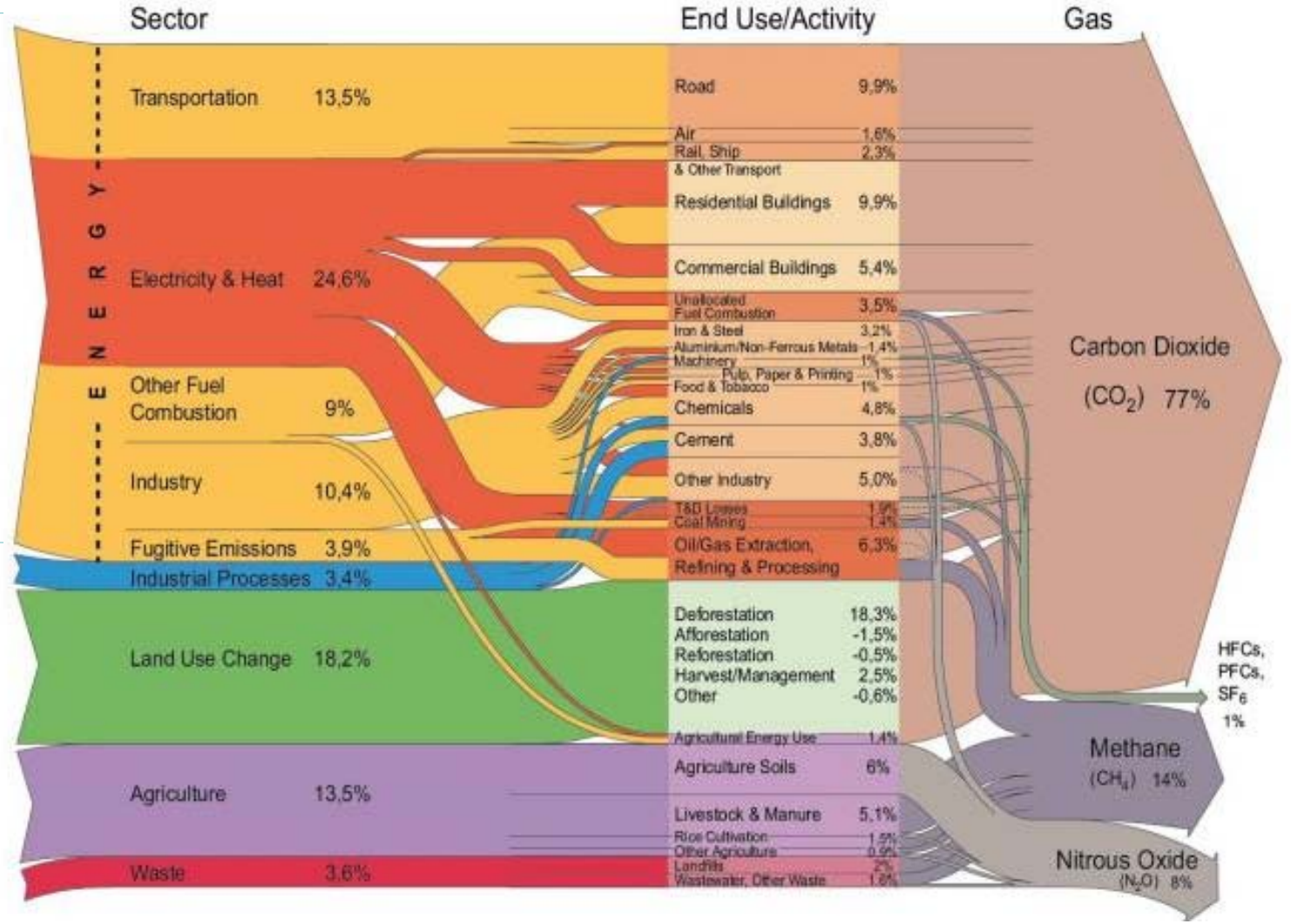
1990 - 1999: 0.9% y^{-1}

2000 - 2007: 3.5% y^{-1}

Data Source: G. Marland, T.A. Boden, R.J. Andres, and J. Gregg at CDIAC

World Greenhouse gas emissions by sector

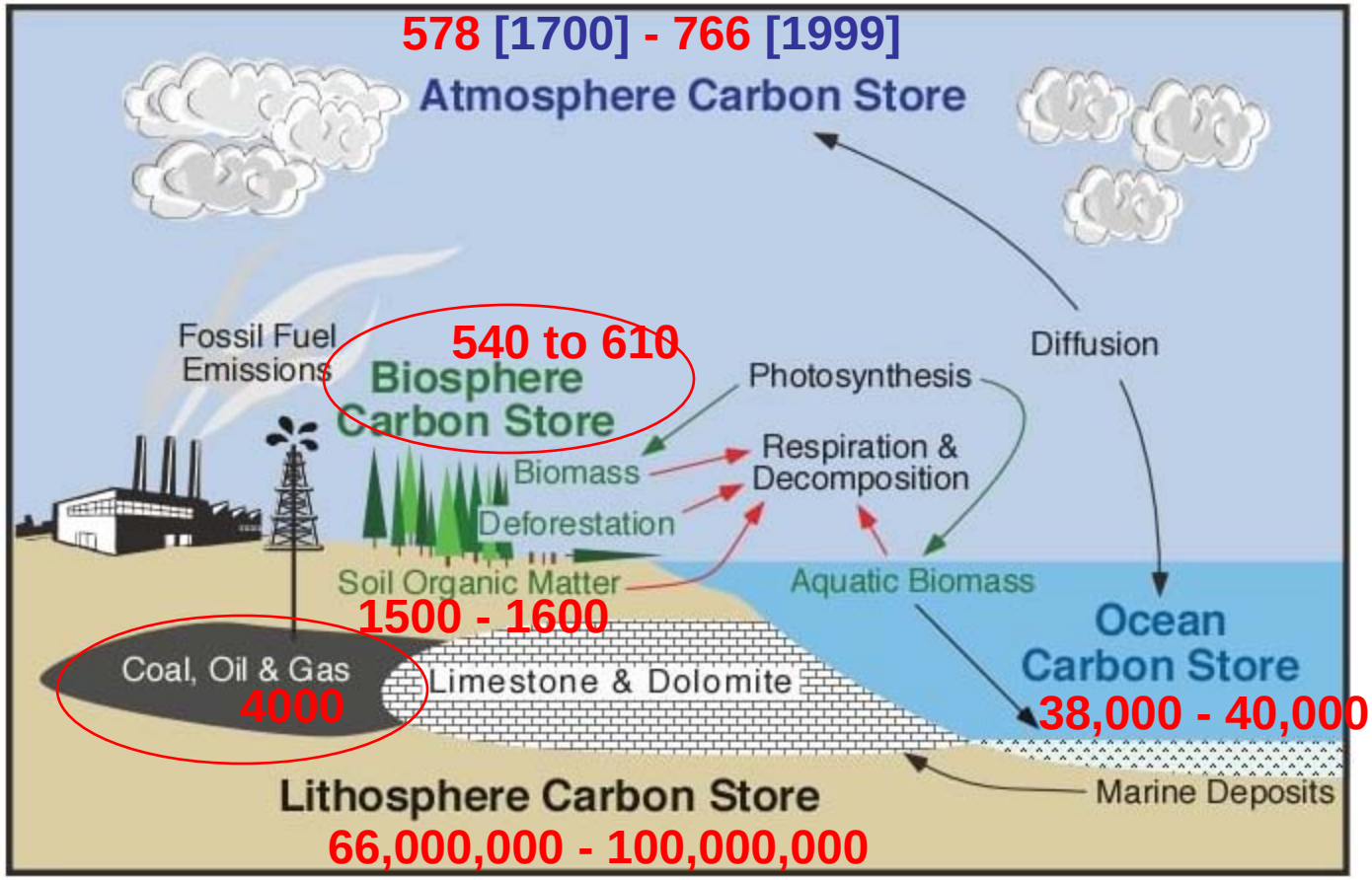
62%



All data is for 2000. All calculations are based on CO_2 equivalents, using 100-year global warming potentials from the IPCC (1996), based on a total global estimate of 41 755 $MtCO_2$ equivalent. Land use change includes both emissions and absorptions. Dotted lines represent flows of less than 0.1% percent of total GHG emissions.

Source: World Resources Institute, Climate Analysis Indicator Tool (CAIT), Navigating the Numbers: Greenhouse Gas Data and International Climate Policy, December 2005; Intergovernmental Panel on Climate Change, 1996 (data for 2000).

Ciclo do Carbono



(Gt C)

Actividades Humanas: + 7 Gt C /ano
[3-4% move-se no ciclo num ano]

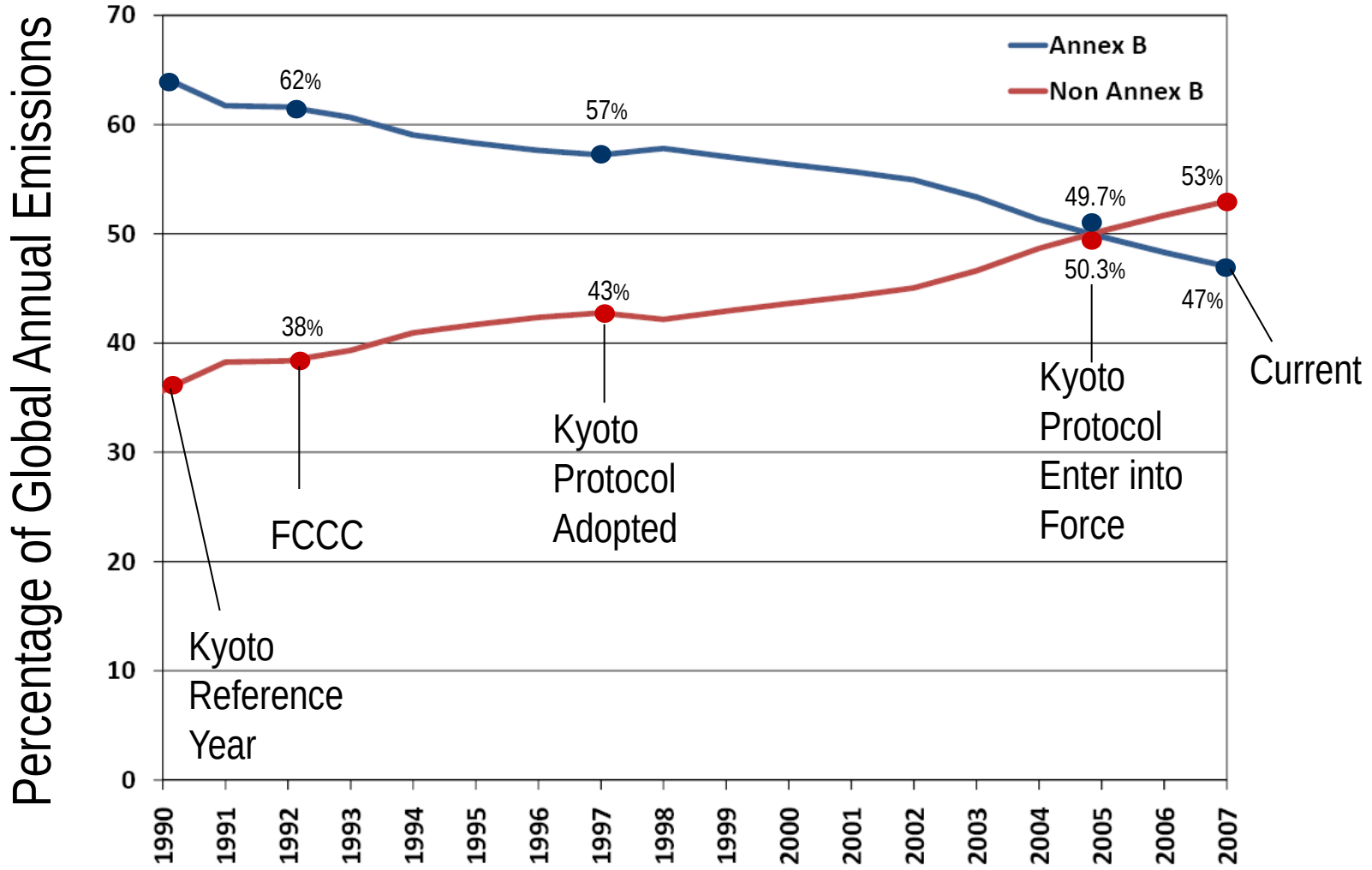
50% absorvido por oceanos e vegetação

50% permanece atmosfera

280 ppm (1700) → 370 ppm (2000) ⇢ 550 ppm (2050)

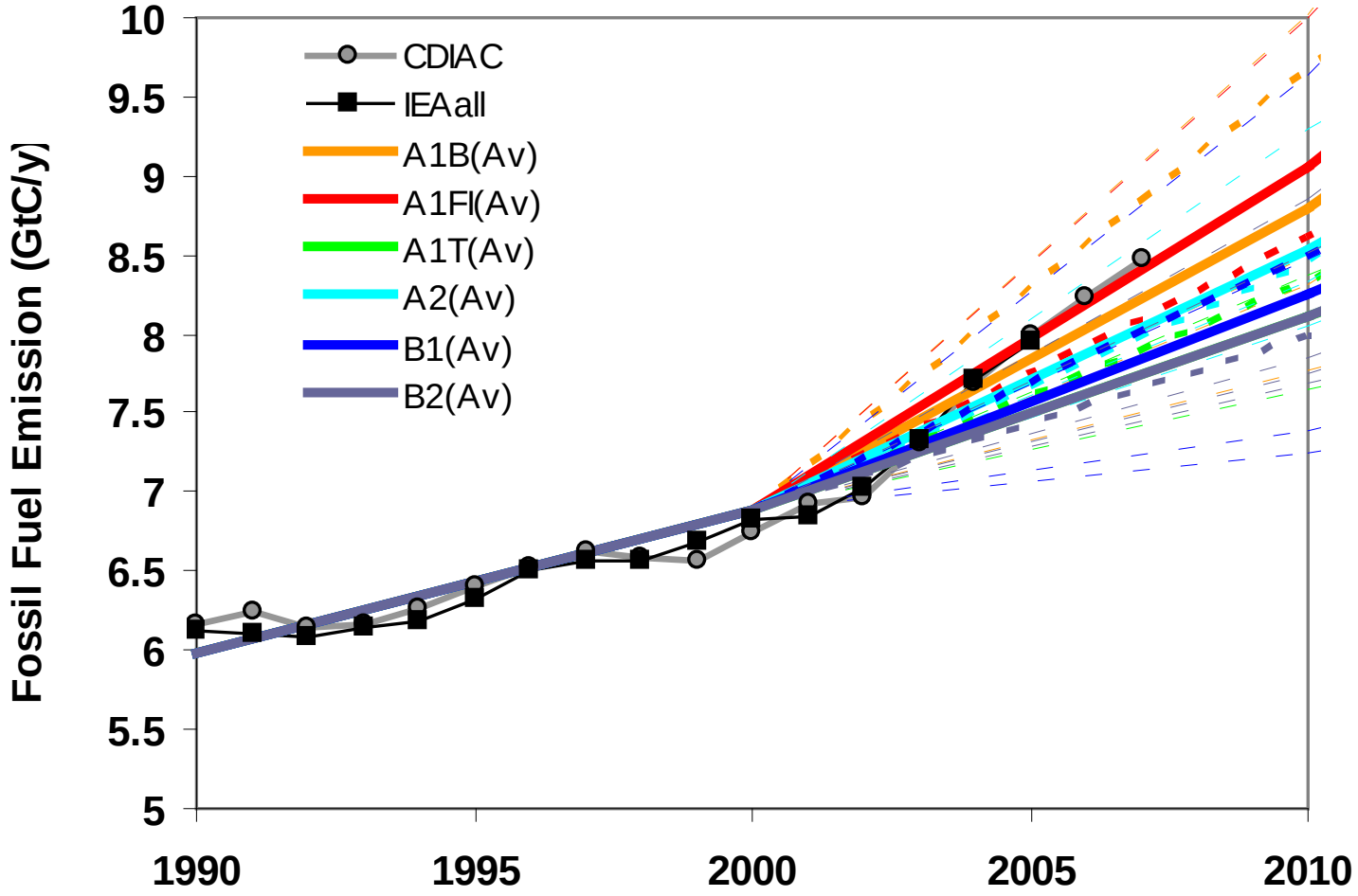
450 ppm (2050)

Países em Desenvolvimento maiores emissores de CO_2



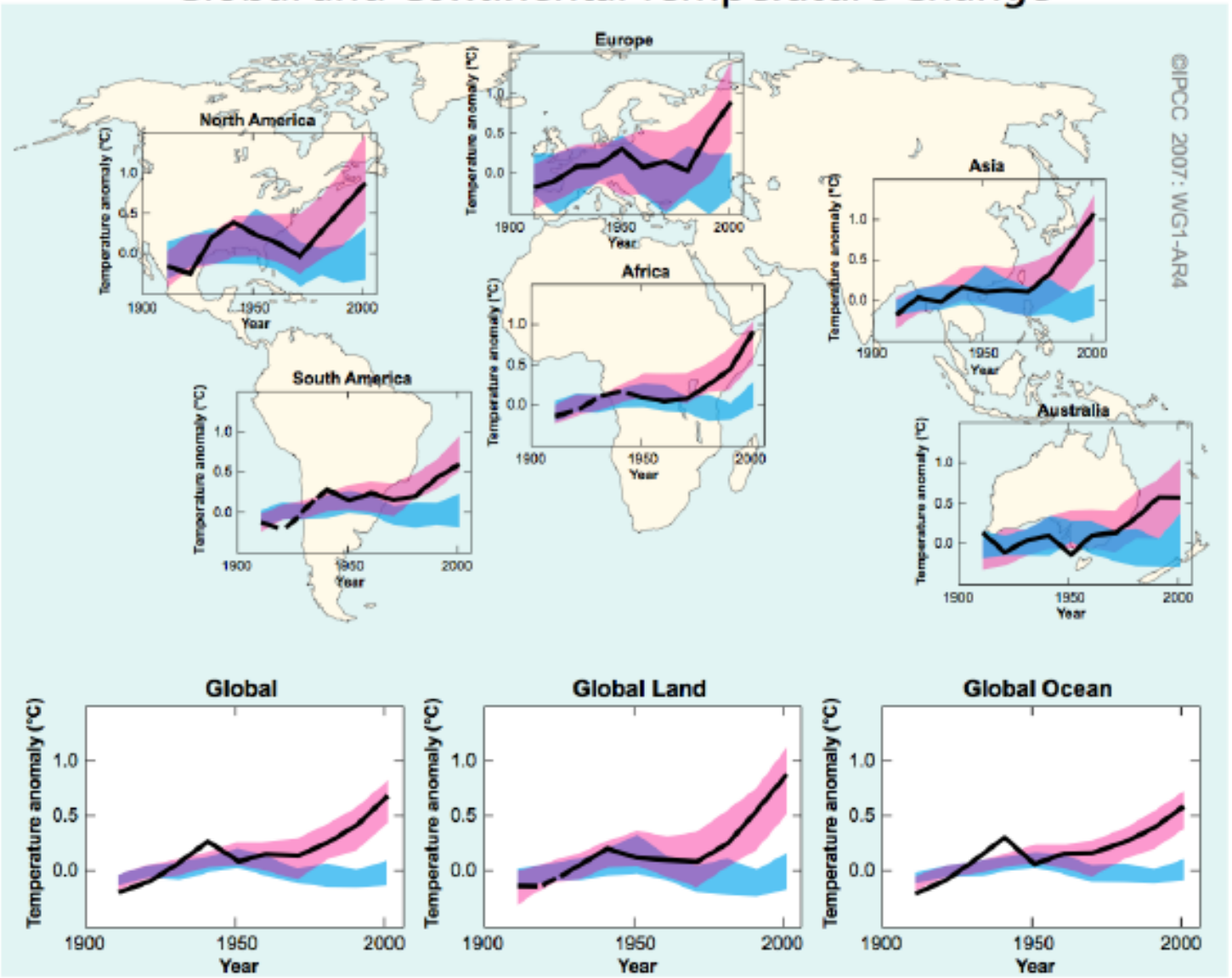
J. Gregg and G. Marland, 2008, personal communication

Emissões de combustíveis fósseis alinham pelo cenário IPCC mais pessimista



Raupach et al 2007, PNAS (updated)

Global and Continental Temperature Change



Fonte: IPPP 4º Assessment Report; Summary for Policy Makers (IPCC, Fev 2007)

Sumário

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Objectivos de mitigação (consensos ±):

- ►limitar o acréscimo da temperatura média global a 2°C;
- ►garantir que as emissões atinjam o pico em 2020-30;
- ►garantir que as emissões se reduzam a 50% em 2050, face a 1990.

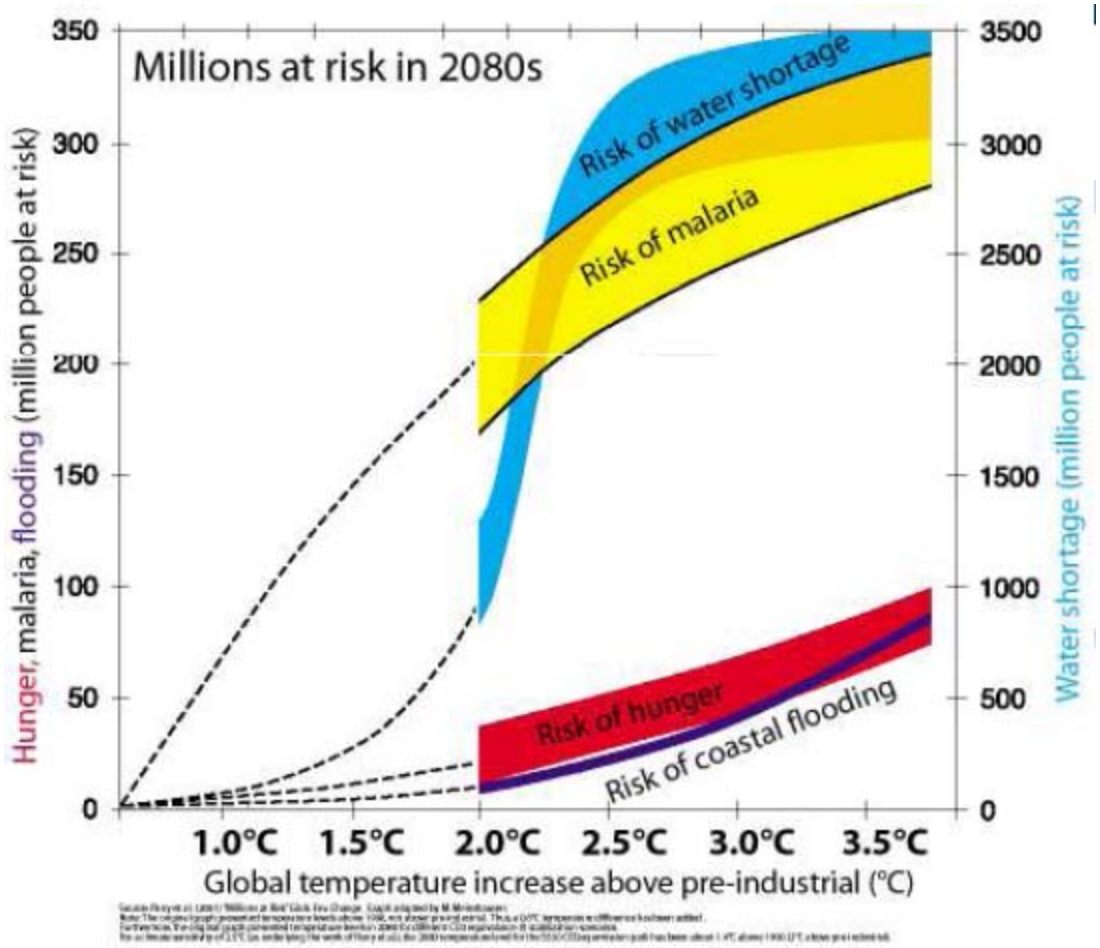
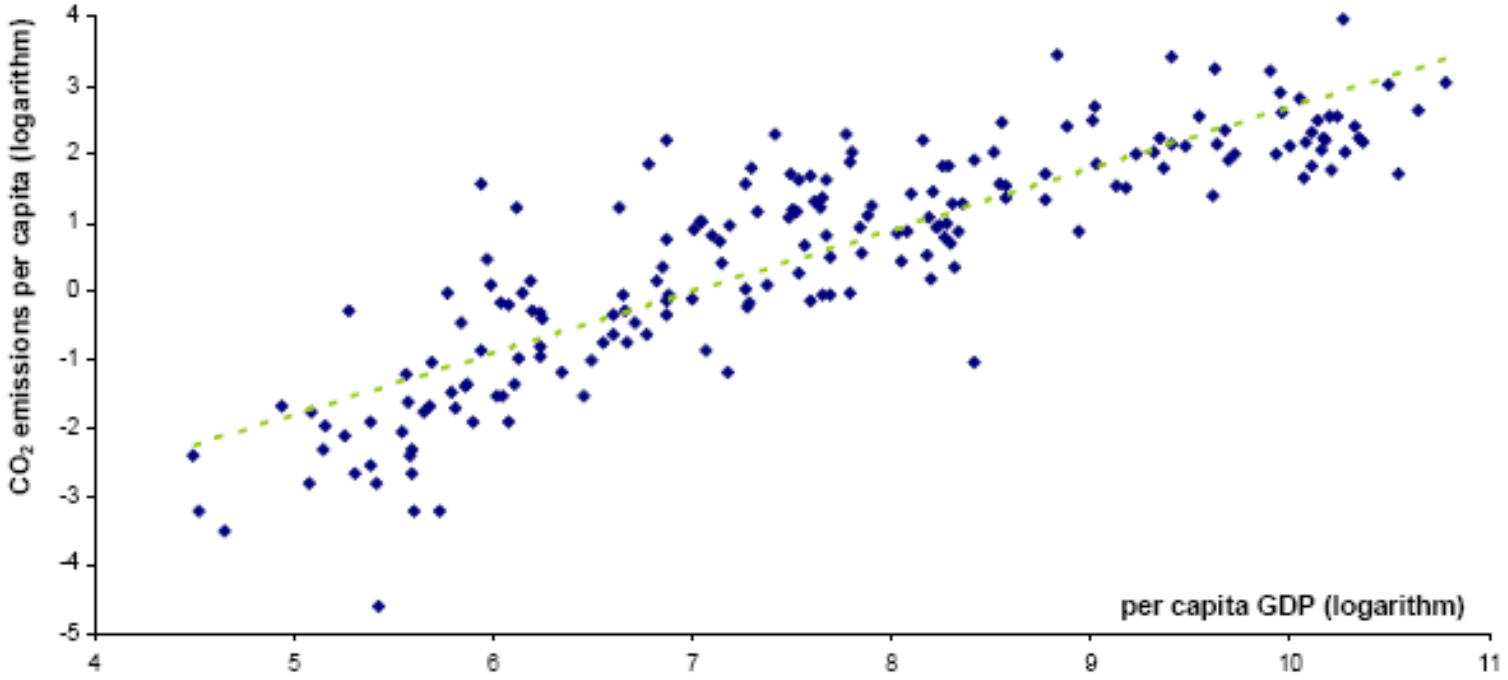


Figure 3 – CO_2 emissions per capita according to per capita GDP in the world in 2002.

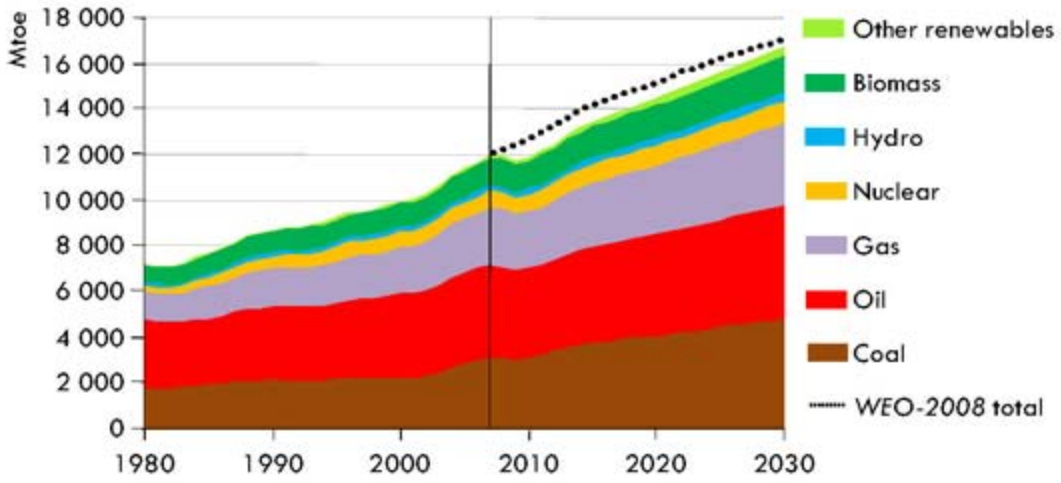


A 1% increase in GDP per capita leads to an estimated increase of about 0.9% in emissions per capita. The fact that the emissions figure is less than1% indicates that emissions increase at a slower pace than economic growth.

Source: World Bank.

World Energy Outlook 2009

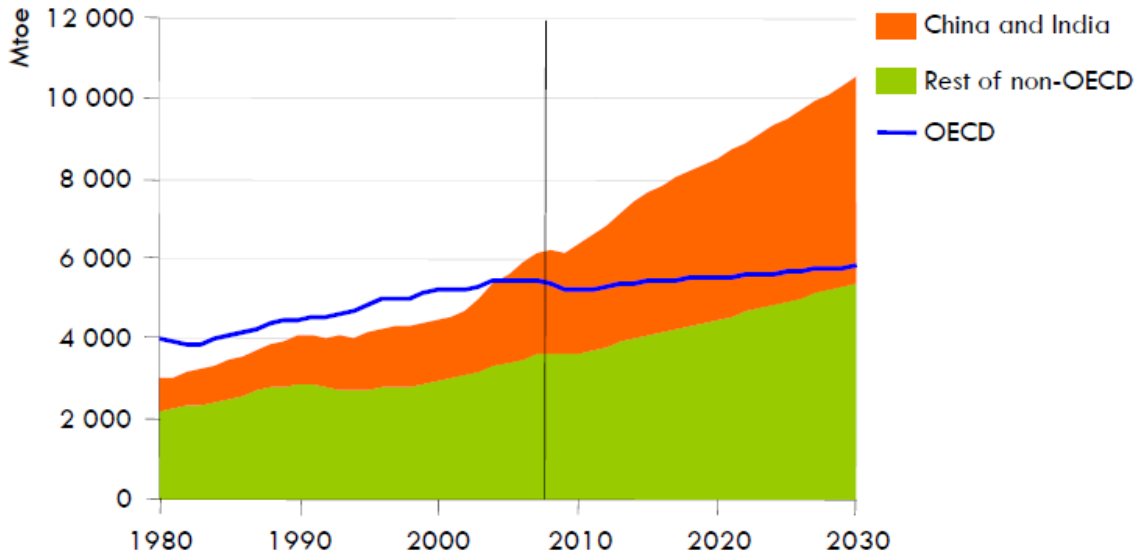
World primary energy demand by fuel in the Reference Scenario



Global demand grows by 40% between 2007 and 2030, with coal use rising most in absolute terms

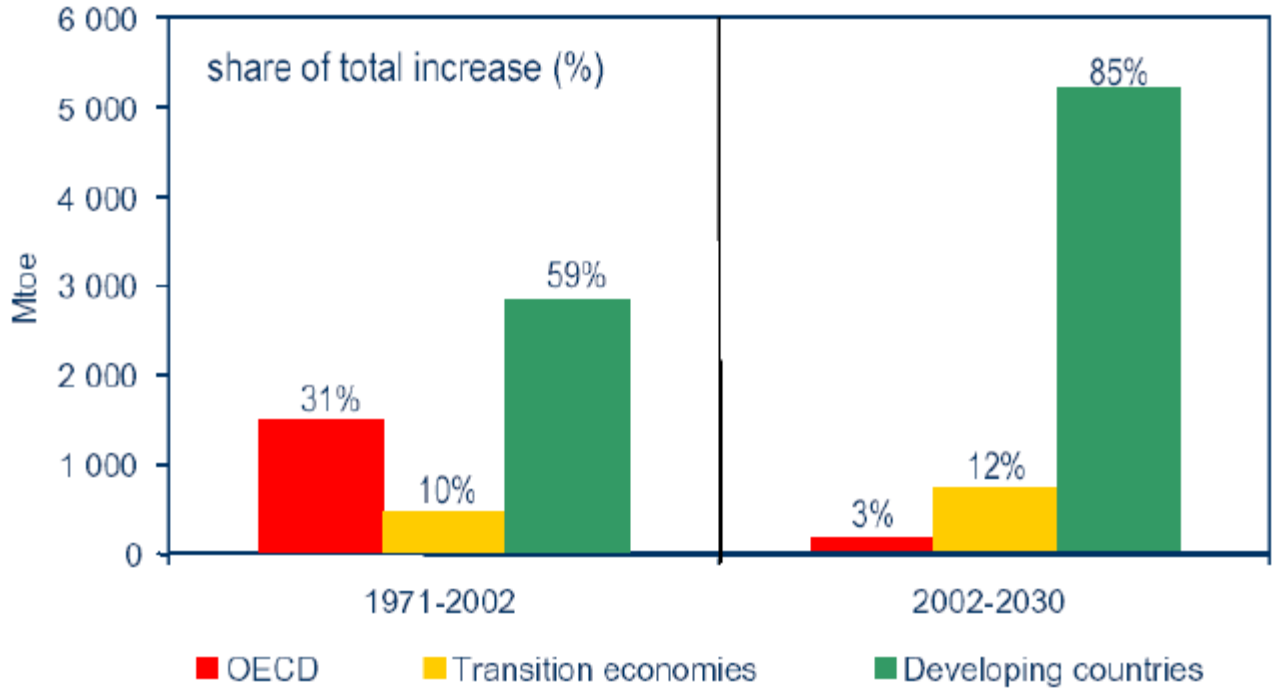
World primary energy demand by fuel in the Reference Scenario

World Energy Outlook 2009

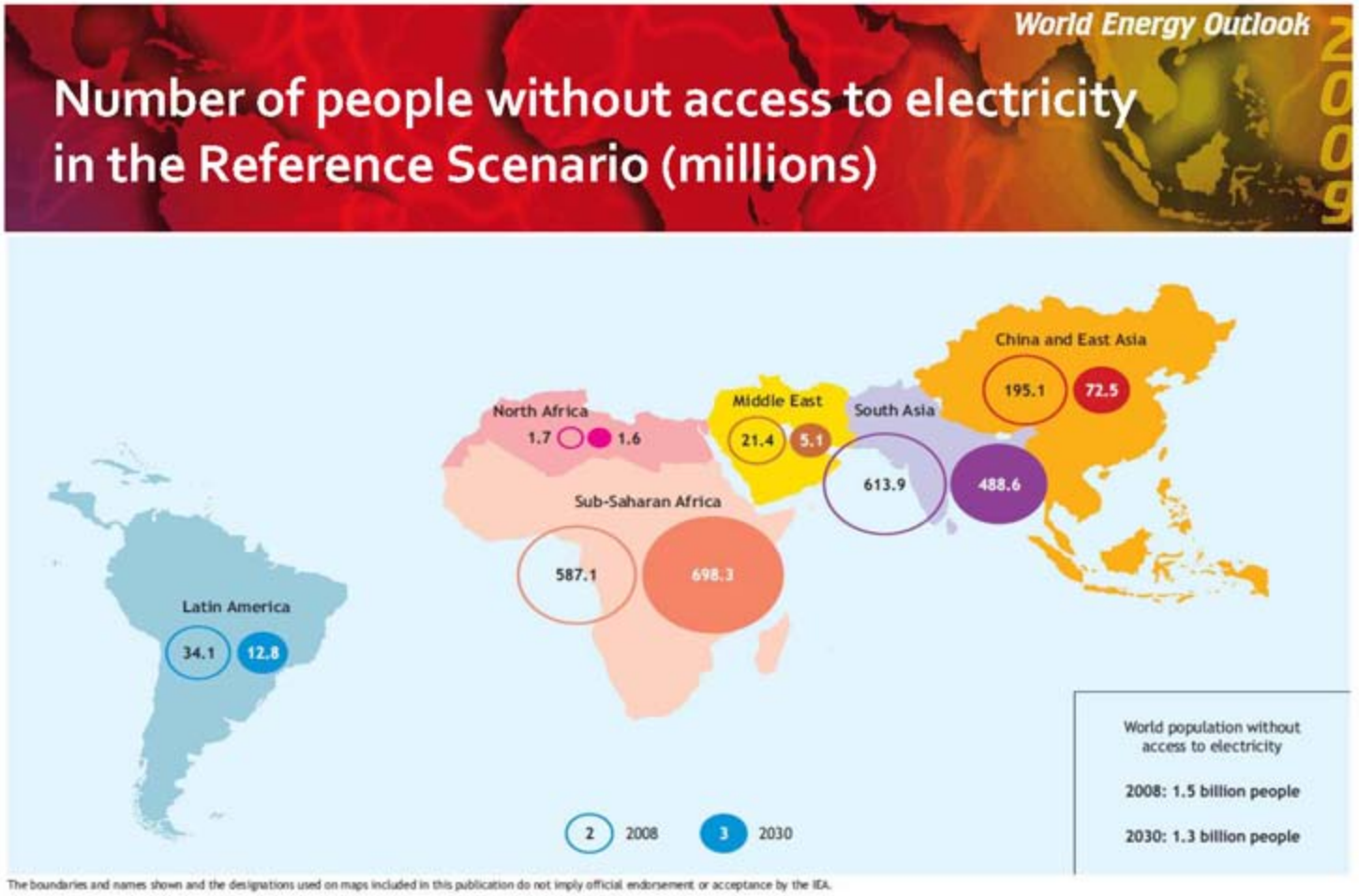


Non-OECD countries account for 93% of the increase in global demand between 2007 & 2030, driven largely by China & India

Evolução dos consumos de energia



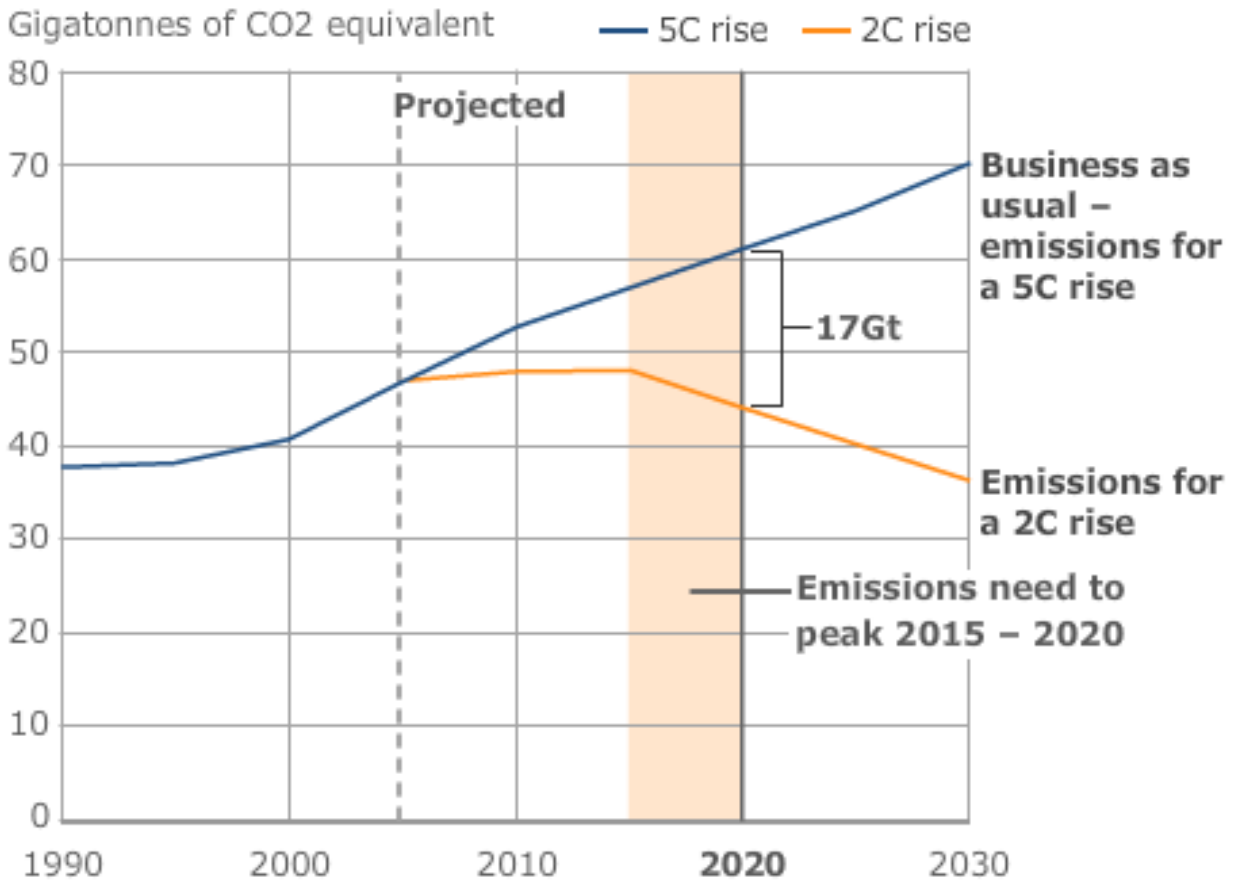
© IEA, CSIS



1.3 billion people – or 16% of the world's population – still lack access to electricity in 2030, despite more widespread prosperity & more advanced technology

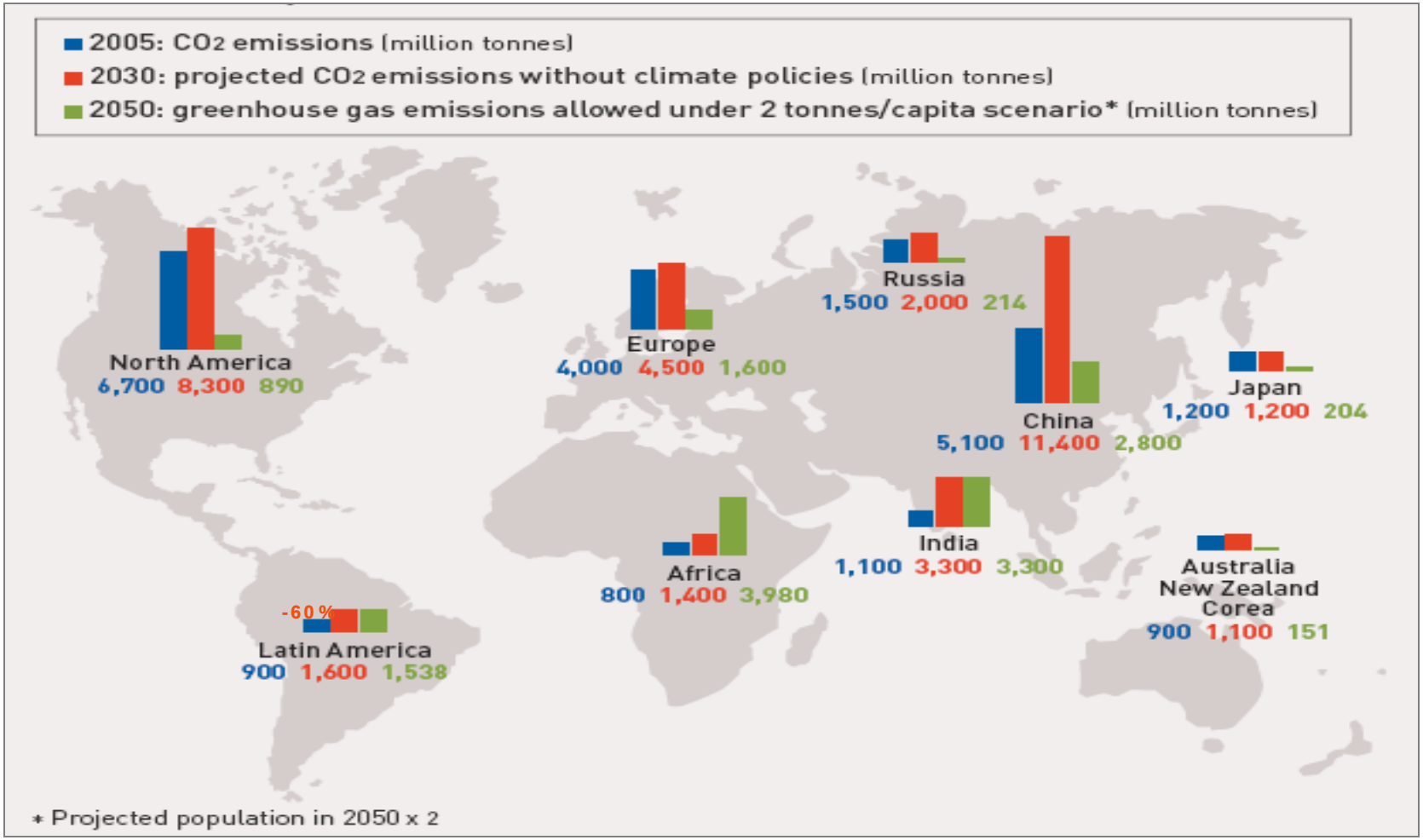
Safer limits

To hit a 2C target, emissions in 2020 must be 17Gt CO2e lower than under "business as usual" - but Copenhagen leaves it unclear how this target would be reached.



Source: European Climate Foundation

Emissões globais (presentes e futuras)



IEA, World Energy Outlook 2007

The Technology Challenge

Stabilising Greenhouse Gas Concentrations in the Atmosphere

No single technology or policy can do it all

Different

- regions
- markets
- scale-up requirements
- infrastructures
- resources
- preferences
- technology timing

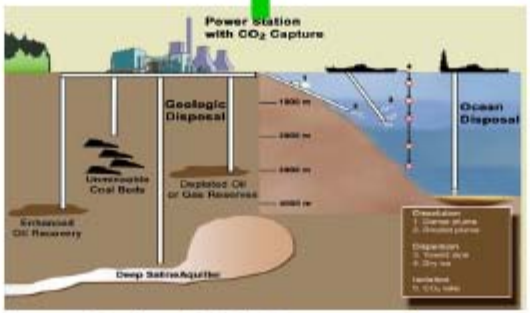
Vehicles: Efficiency, Bio-fuels, Hydrogen Fuel Cells

Renewable Energy Technologies

Zero Net Emission Bldgs., Industrial Efficiency, CHP

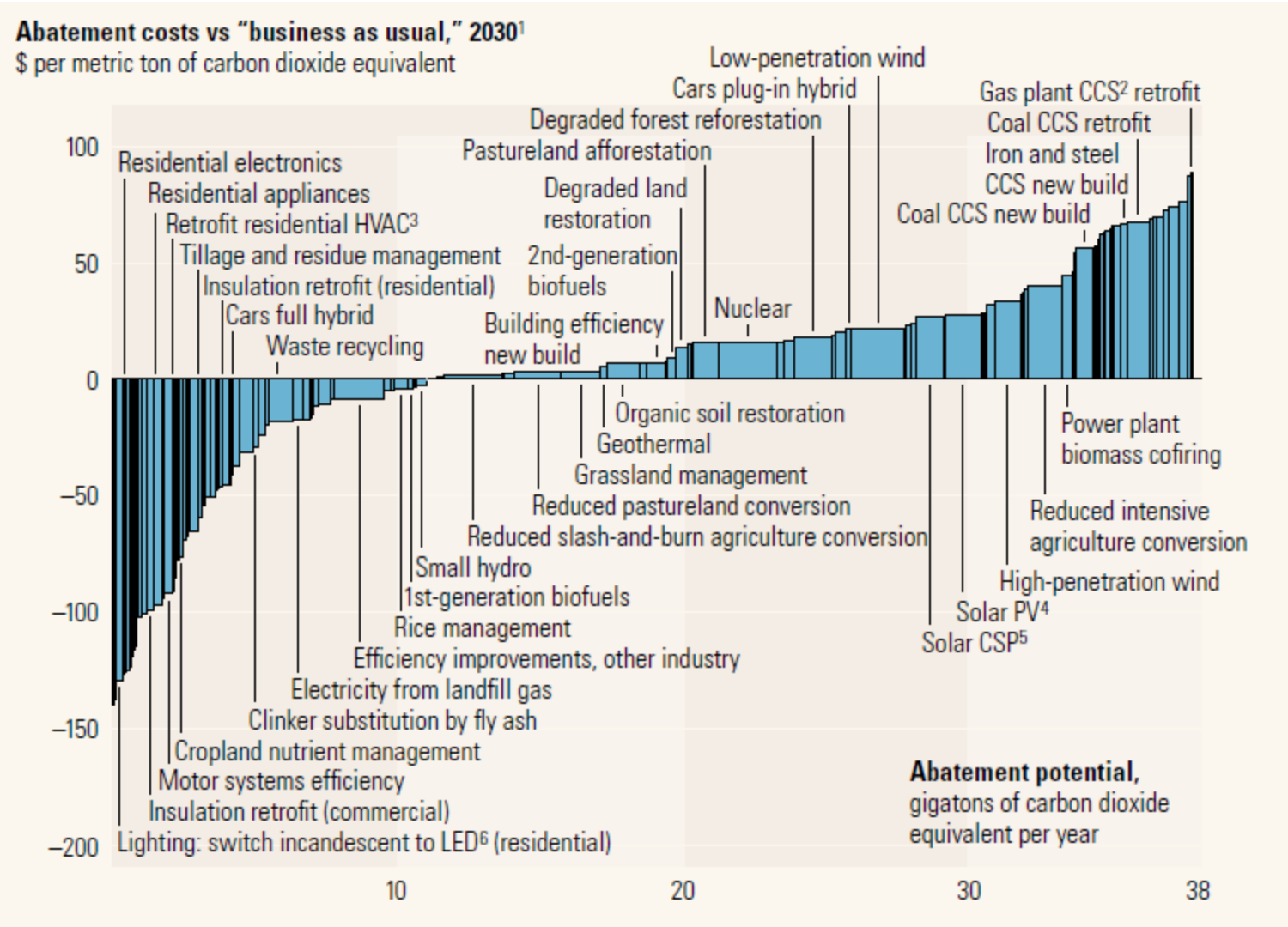
Bio-Fuels and Power

Nuclear Power Generation IV



Carbon (CO_2) Sequestration

Advanced Power Grids



[1]The curve presents an estimate of the maximum potential of all technical greenhouse gas abatement measures below $90 per metric ton of CO_2e if each lever was pursued aggressively. It is not a forecast of what role different abatement measures and technologies will play.
[2]Carbon capture and storage.
[3]Heating, ventilating, and air conditioning.
[4]Photovoltaic.
[5]Concentrating solar power.
[6]Light-emitting diode.

Fonte: McKinsey, 2009
http://www.mckinsey.com/clientservice/ccsi/pdf/low_carbon_economy.pdf

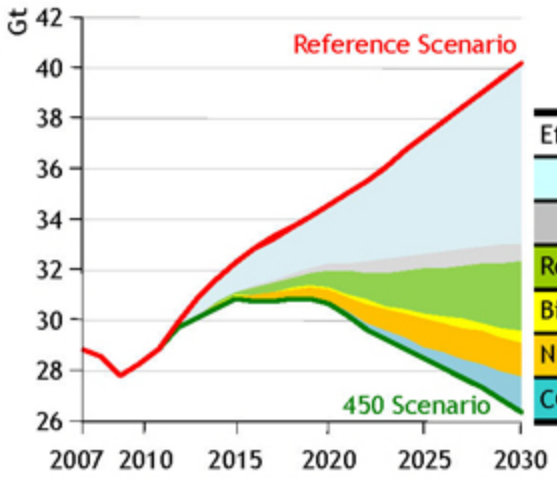
The policy mechanisms in the 450 Scenario

World Energy Outlook 2009

- A combination of policy mechanisms, which best reflects nations' varied circumstances & negotiating positions
- We differentiate on the basis of three country groupings
  - *OECD+: OECD & other non-OECD EU countries*
  - *Other Major Economies (OME): Brazil, China, Middle East, Russia & South Africa*
  - *Other Countries (OC): all other countries, including India & ASEAN*
- A graduated approach
  - *Up to 2020, only OECD+ have national emissions caps*
  - *After 2020, Other Major Economies are also assumed to adopt emissions caps*
  - *Through to 2030, Other Countries continue to focus on national measures*
- Emissions peaking by 2020 will require
  - *A CO_2 price of $50 per tonne for power generation & industry in OECD+*
  - *Investment needs in non-OECD countries of $200 billion in 2020, supported by OECD+ through carbon markets & co-financing*

World Energy Outlook 2009

World abatement of energy-related CO_2 emissions in the 450 Scenario

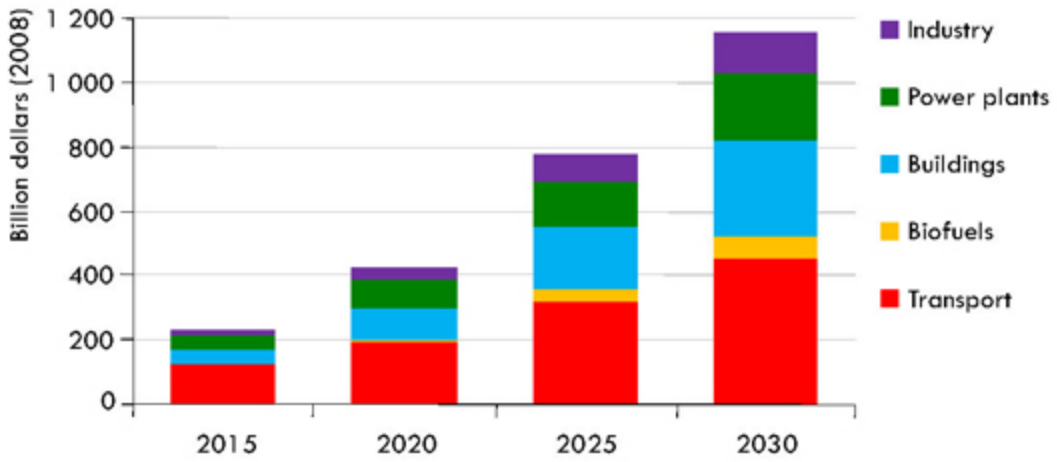


	Abatement ($Mt CO_2$)		Investment ($2008 billion)	
	2020	2030	2010-2020	2021-2030
Efficiency	2 517	7 880	1 999	5 586
End-use	*2 284*	*7 145*	*1 933*	*5 551*
Power plants	*233*	*735*	*66*	*35*
Renewables	680	2 741	527	2 260
Biofuels	57	429	27	378
Nuclear	493	1 380	125	491
CCS	102	1 410	56	646

Efficiency measures account for two-thirds of the 3.8 Gt of abatement in 2020, with renewables contributing close to one-fifth

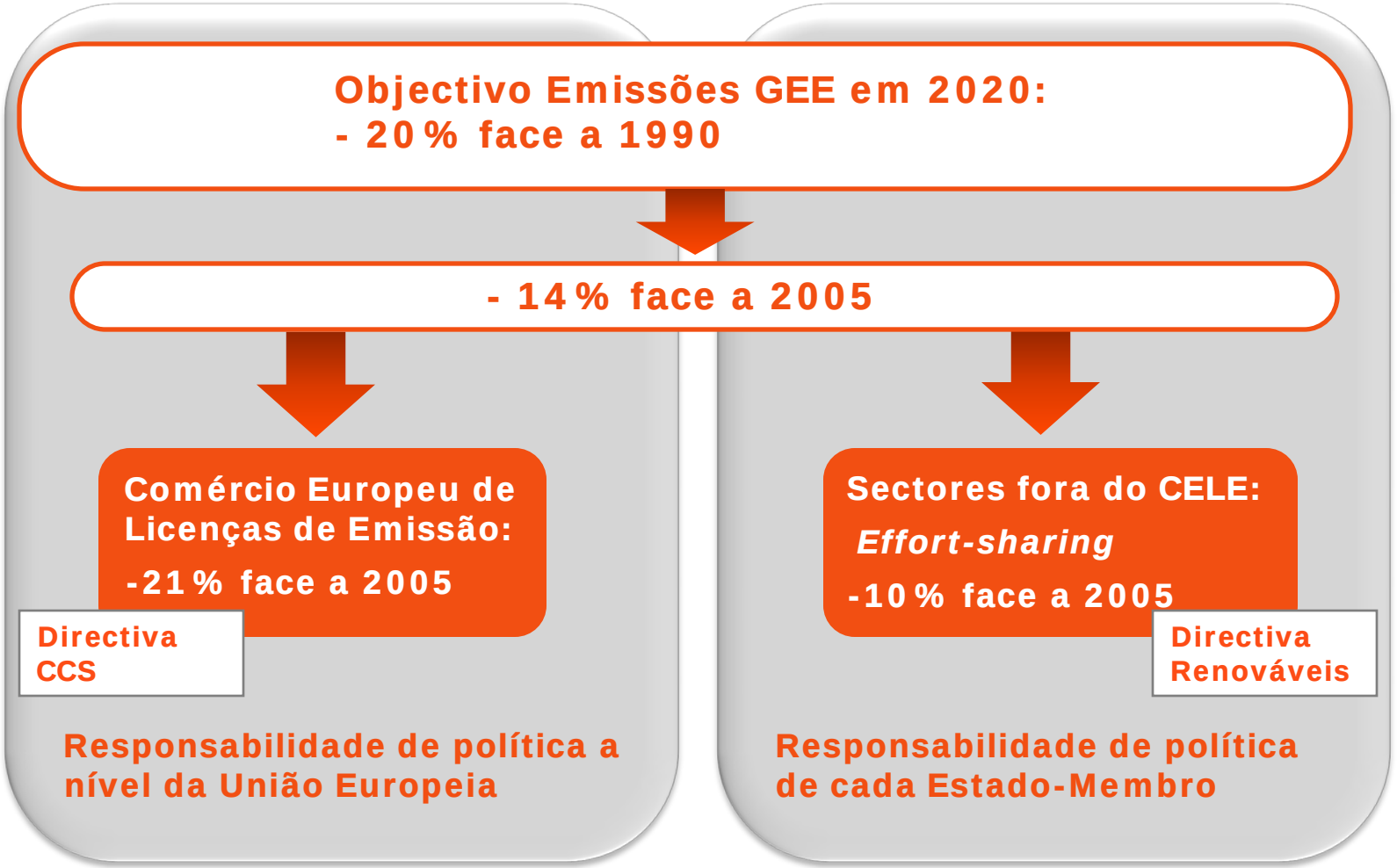
World Energy Outlook 2009

World additional investment in the 450 Scenario relative to the Reference Scenario



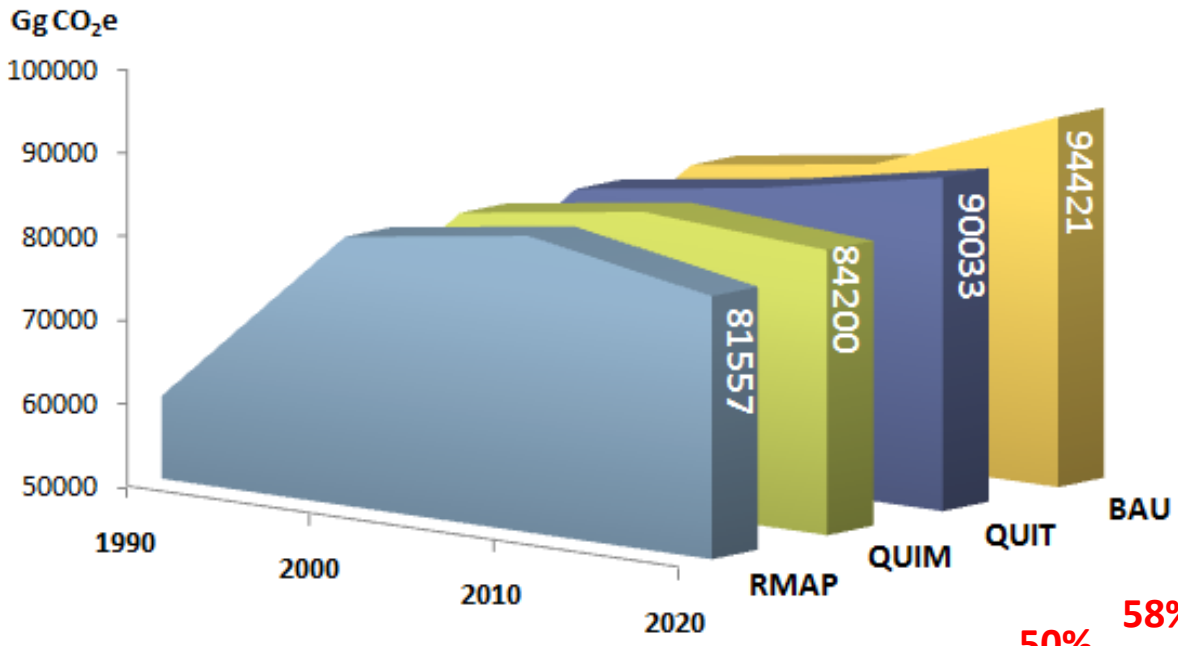
$10.5 trillion of additional investment is needed in the 450 Scenario in the period 2010-2030 compared with the Reference Scenario, costing 0.5% of GDP in 2020 & 1.1% of GDP in 2030

Pacote Energia-Clima 2013-2020 na União Europeia



Análise FCT-UNL /E.Value | Portugal
Sem restrições adicionais

PortugalClima2020



	RMAP	QUIM	QUIT	BAU	
EMISSÕES GEE	36%	40%	50%	58%	% / 1990
	-36%	-24%	-20%	-10%	% / 2000
Intensidade Carbónica PIB	-30%	-25%	-10%	25%	% / 2020
Intensidade Energética PIB	-10%	31%	28%		
[2005: 13%] Fonte Renovável En. Primária	34%	51%	50%	50%	% / 2020
[2005: 36%] Fonte Renovável Electricidade	63%				

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COP15 COPENHAGEN

UNITED NATIONS CLIMATE CHANGE CONFERENCE 2009

Acordo de Copenhagen:

• Reconhece o objectivo dos 2ºC e a necessidade de o rever em 2015 para 1.5ºC;

• Convoca os países desenvolvidos e em desenvolvimento para enviarem os seus objectivos de reduçãod e emissões até 31 Janeiro 2010;

• Reconhece a necessidade de acção em matéria de adaptação em países em desenvolvimento, especialmente as pequenas ilhas e África;

• Apresenta os principais elementos para um novo fundo para suportar a mitigação e adaptação nos países em desenvolviment: US$ 30 bn para 2010–2012 e US$ 100 bn anualmente em 2020;

•

• sublinha a importância de estabelecer uma monitorização, reporte e verificação robusta;

• sublinha a necessidade de estabelecer imediatamente mecanismos de redução de emissões da desflorestação e degradação da floresta;

COP15 COPENHAGEN

UNITED NATIONS CLIMATE CHANGE CONFERENCE 2009

Acordo de Copenhagen:

- Acordo Vinculativo; X
- Objectivos de redução para 2020; X
- Monitorização e verificação internacional; X
- Financiamento de acções nos Países em Desenvolvimento; V

- Que impacto para a União Europeia?
- Que impacto para Portugal?

"Global warming?
Don't worry, it won't affect us ...
we have air conditioning."