

Mitigation action in developing countries for staying below 2 degree

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WWF International
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Principals to guide action

- **Accept emerging science – and sometimes this means moving goal posts**
- **Listen to concerns and constraints of NAI such as MDG**
- **Do not bully NAI – develop trust and confidence**
- **There is need for differentiation among NAI**
- **Building alliances with NAI**
- **“Common but differentiated responsibilities”**
- **Historic carbon and atmospheric debts**
- **Capacity to act**
- **Per capita emissions**
- **Understand and support actions of NAI to combat climate change**
- **All countries have to do more!**





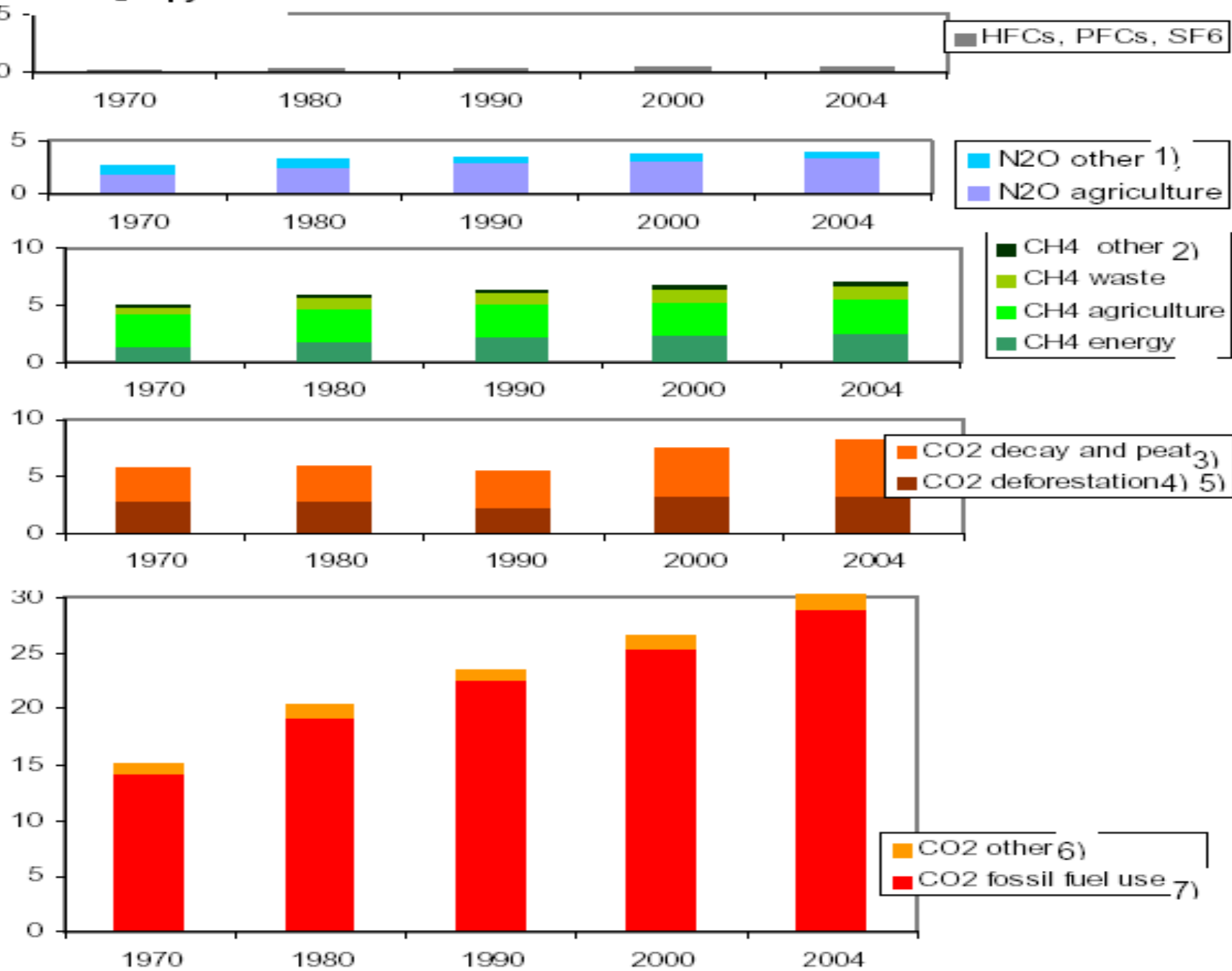
Finally....

“There is enough in this world for everyone’s need but not for everyone’s greed” (M Gandhi)



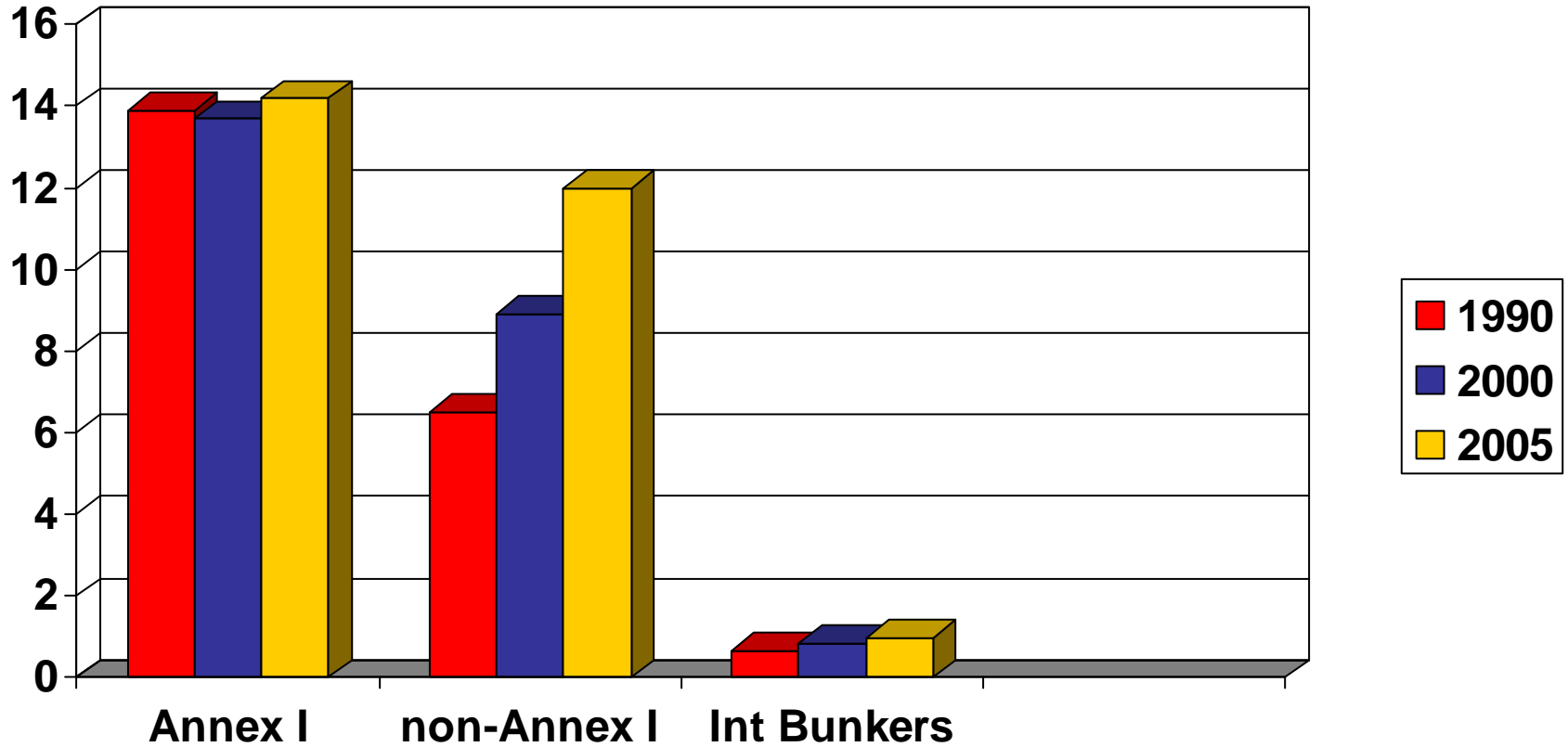


GtCO₂-eq/yr





Fossil Fuel CO2 emissions development



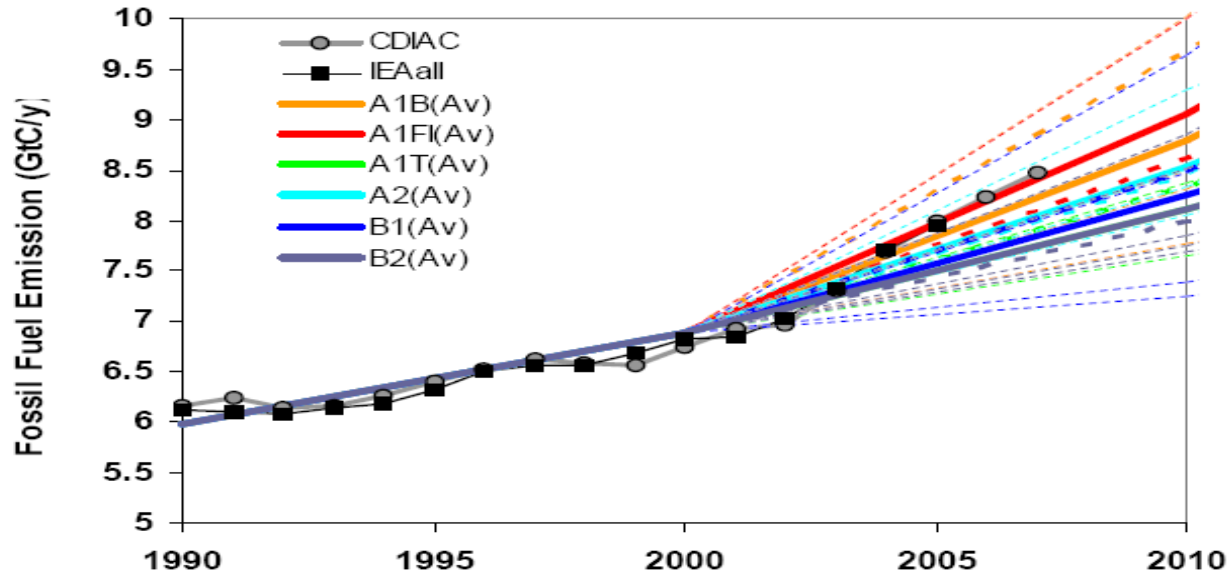
Source: IEA, 2007





Emissions close to worst case scenarios

Fossil Fuel Emissions: Actual vs. IPCC Scenarios



Raupach et al 2007, PNAS (updated)

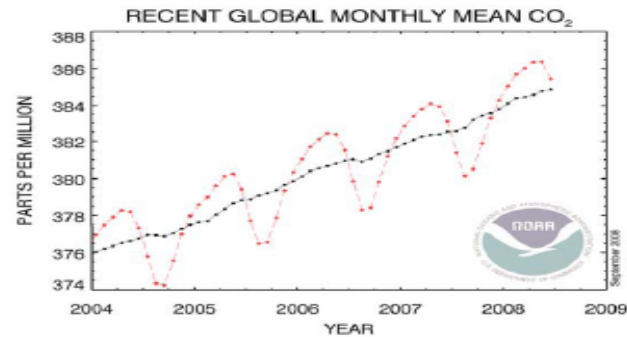




Concentration trends

Atmospheric CO₂ Concentration

Year 2007
 Atmospheric CO₂
 concentration:
383 ppm
 37% above pre-industrial



1970 – 1979: 1.3 ppm y⁻¹
 1980 – 1989: 1.6 ppm y⁻¹
 1990 – 1999: 1.5 ppm y⁻¹
 2000 - 2007: **2.0 ppm y⁻¹**
 2007: **2.2 ppm y⁻¹**



Data Source: Pieter Tans and Thomas Conway, NOAA/ESRL



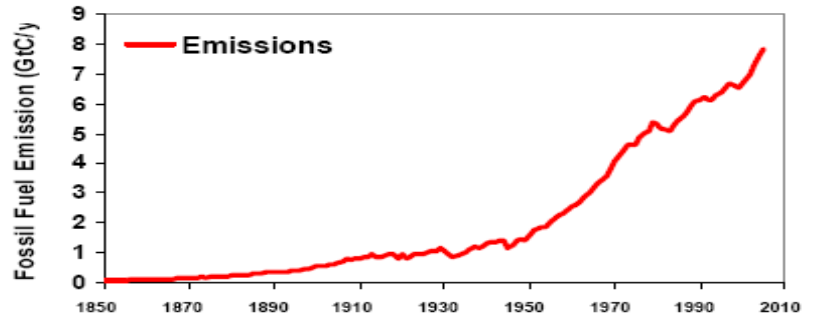


Emissions rise ever faster

Emissions from Fossil Fuel + Cement



2007 Fossil Fuel: 8.5 Pg C



1990 - 1999: 0.9% y^{-1}
2000 - 2007: 3.5% y^{-1}

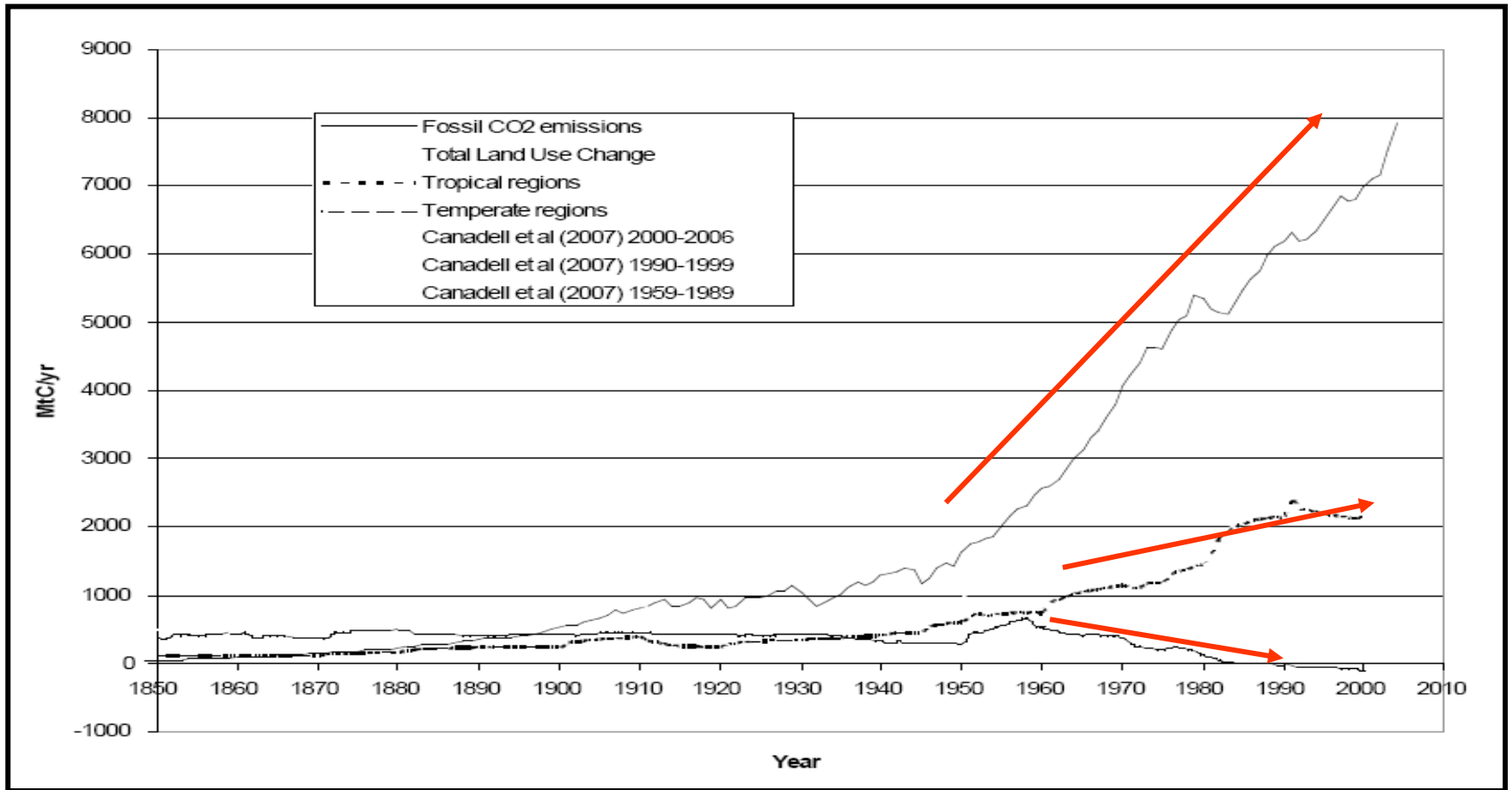


Data Source: G. Marland, T.A. Boden, R.J. Andres, and J. Gregg at CDIAC





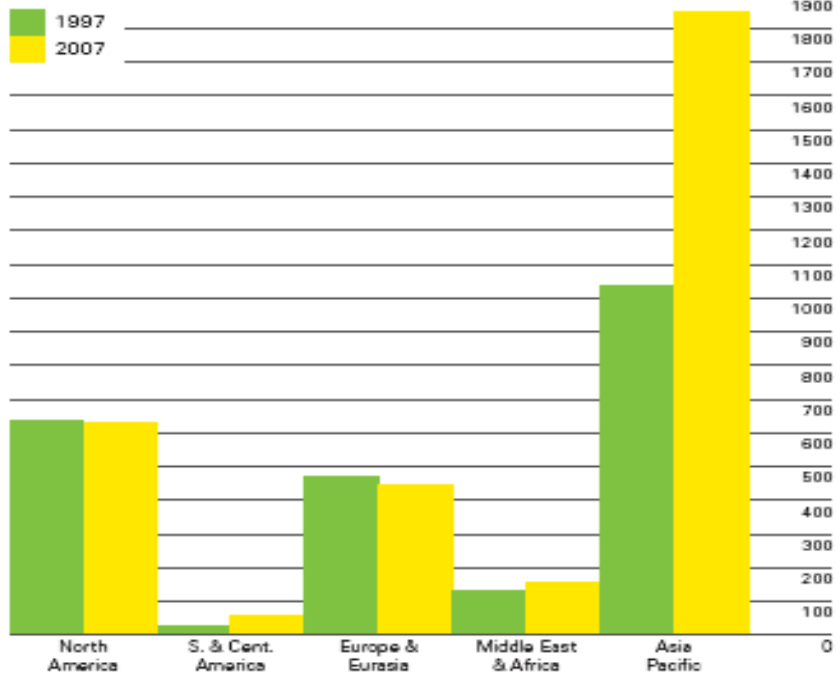
Annual CO2 emissions since 150 years (CDIAC, 2007)



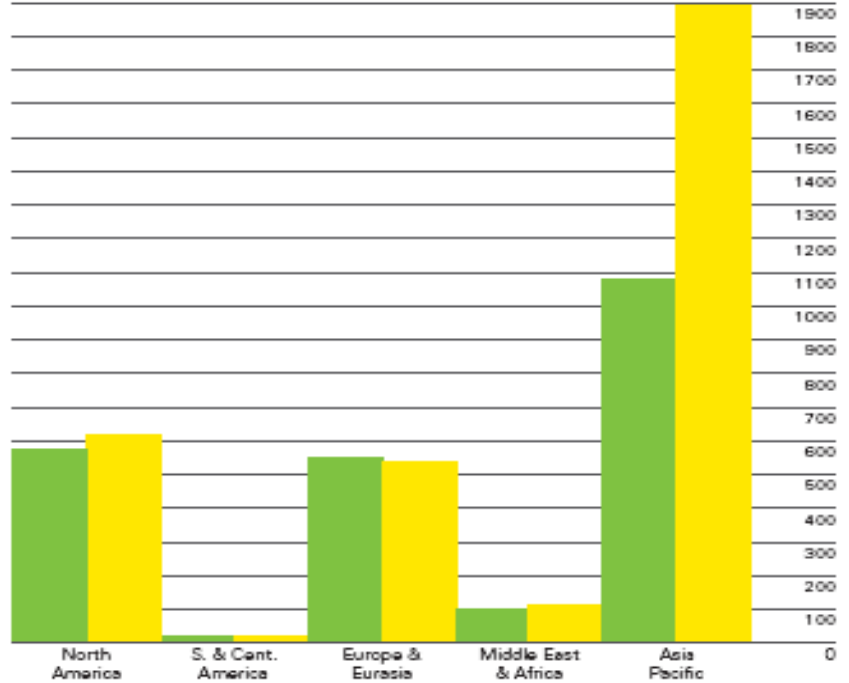


Coal consumption/production has doubled between 1997 and 2007

Production
Million tonnes oil equivalent



Consumption
Million tonnes oil equivalent

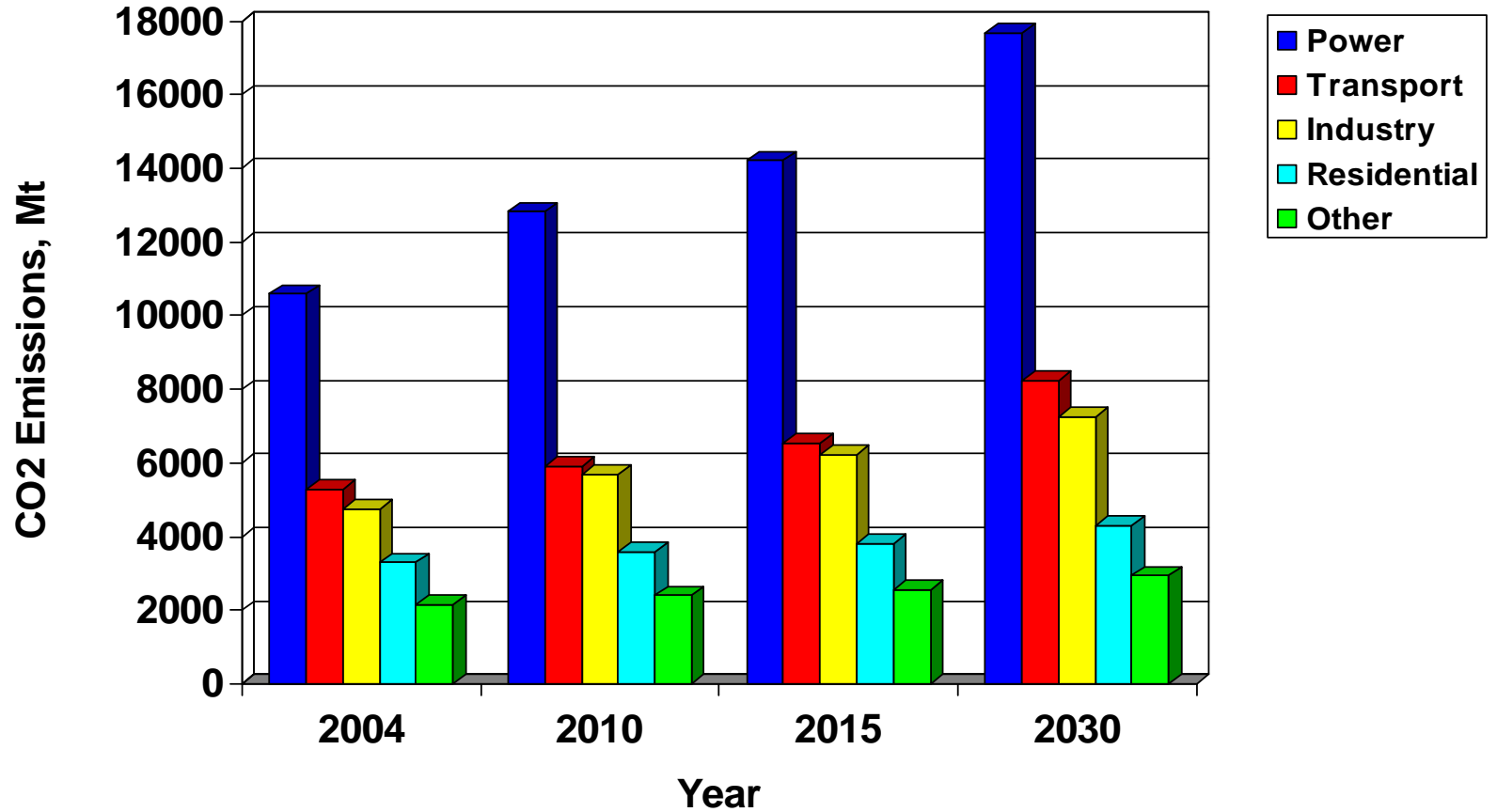


World coal consumption grew by 4.5%, well above the 10-year average. Coal was the world's fastest-growing fuel for the fifth consecutive year. Growth was above average in all regions except the Middle East. Chinese consumption growth accounted for more than two-thirds of global growth.



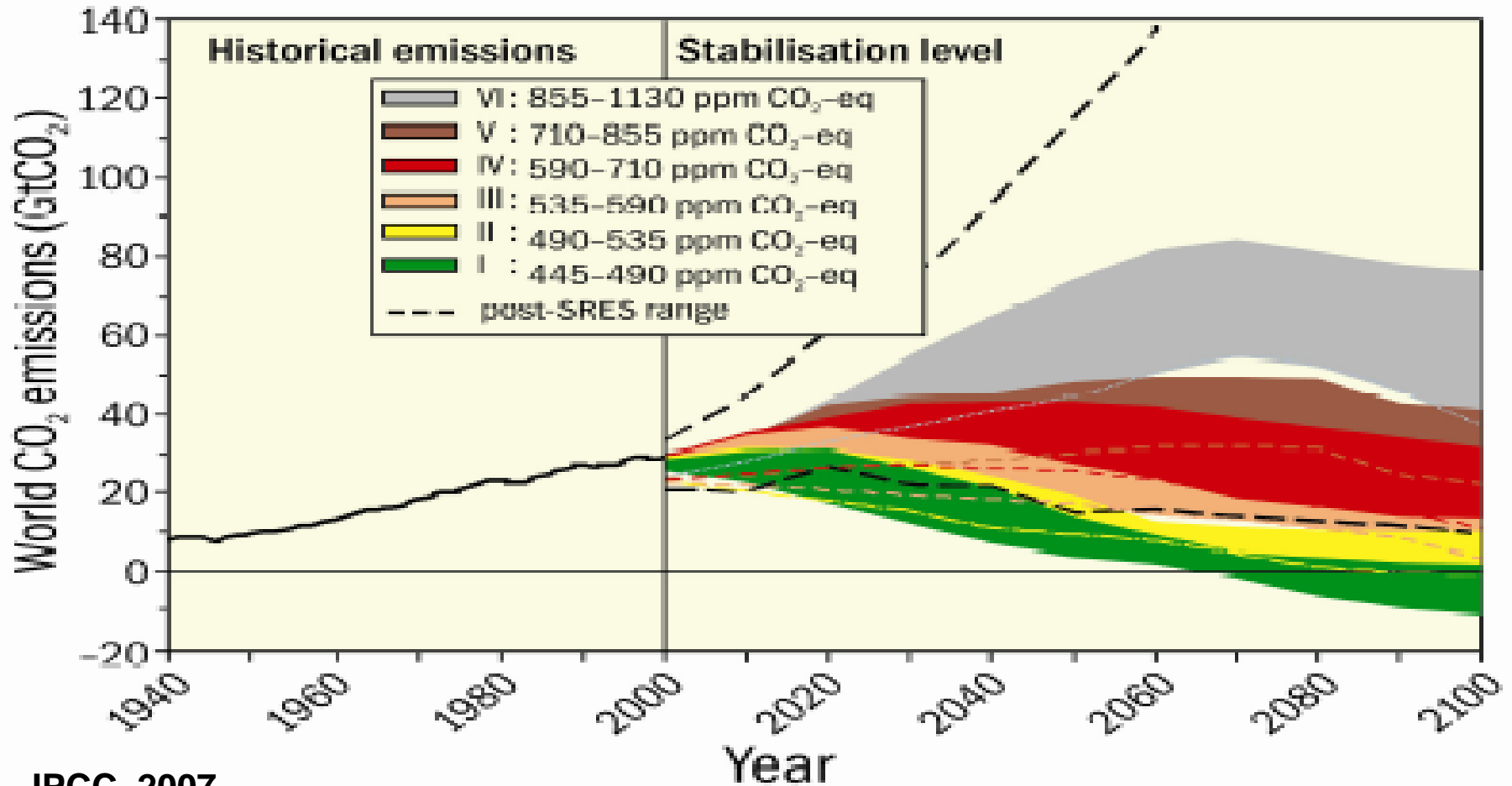


BAU World CO₂ Energy Emissions (IEA, 2006)





Low atmospheric concentration requires net zero emissions world by 2070



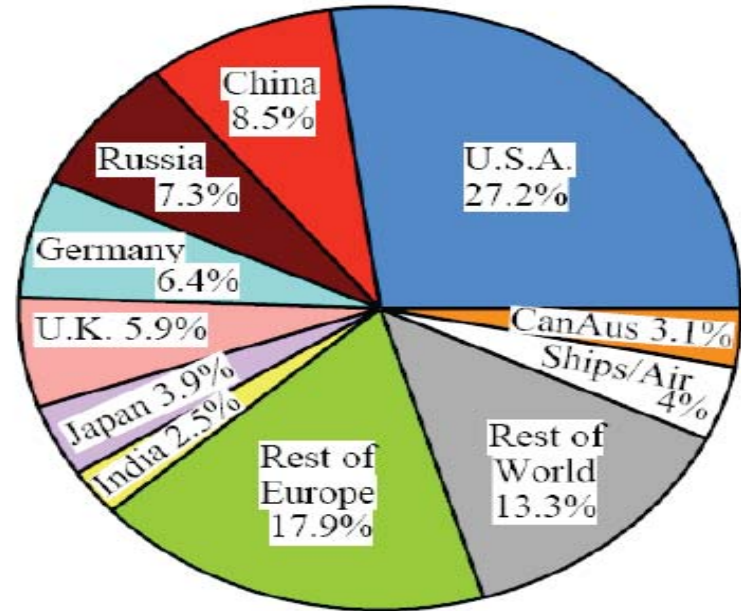
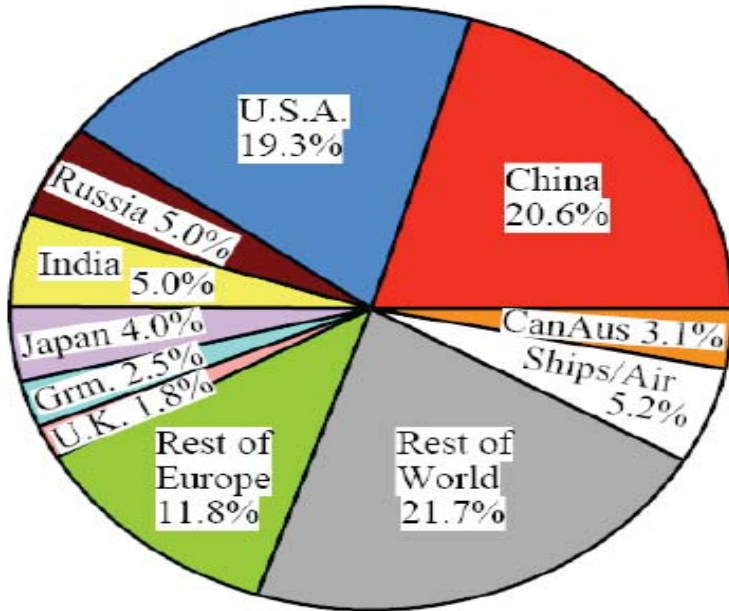


Current emissions and historic responsibility

Fossil Fuel CO₂ Emissions

(a) 2007 Annual Emissions

(b) 1751-2007 Cumulative Emissions

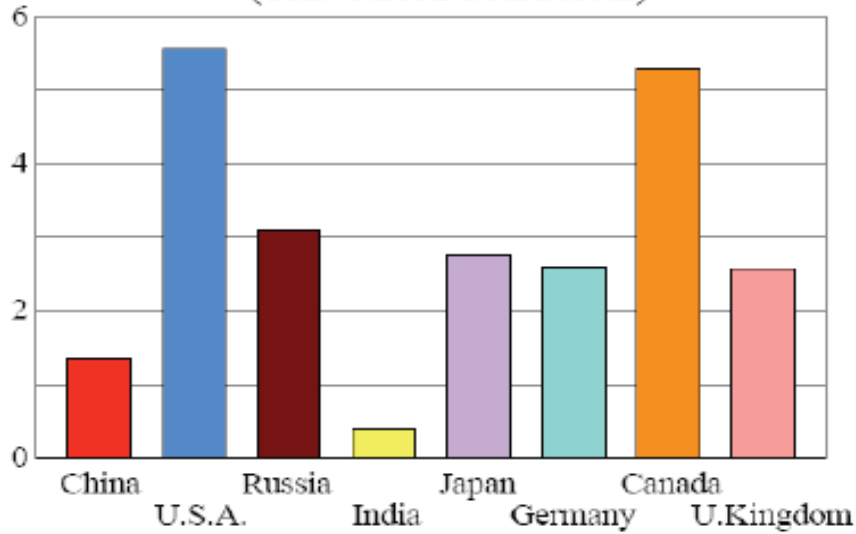




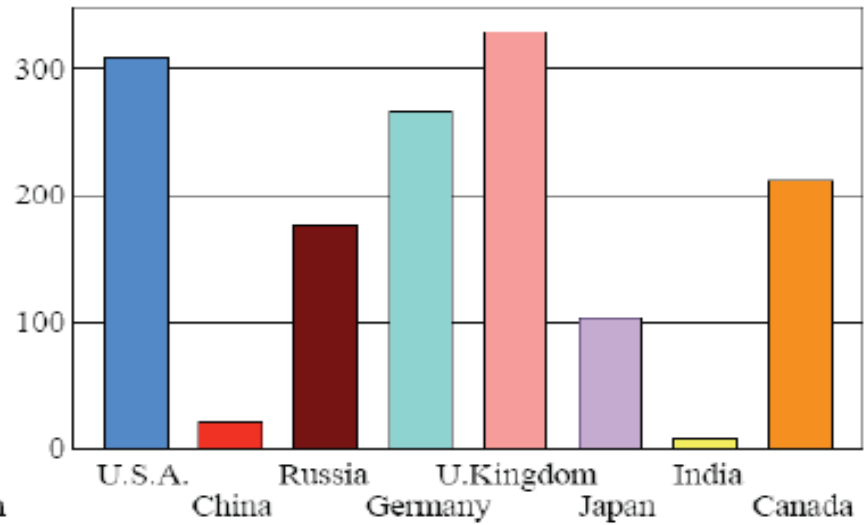
Equity must be part of the New Deal

Per Capita Fossil Fuel CO₂ Emissions

(a) 2007 Annual Emissions
(Tons Carbon/Year/Person)

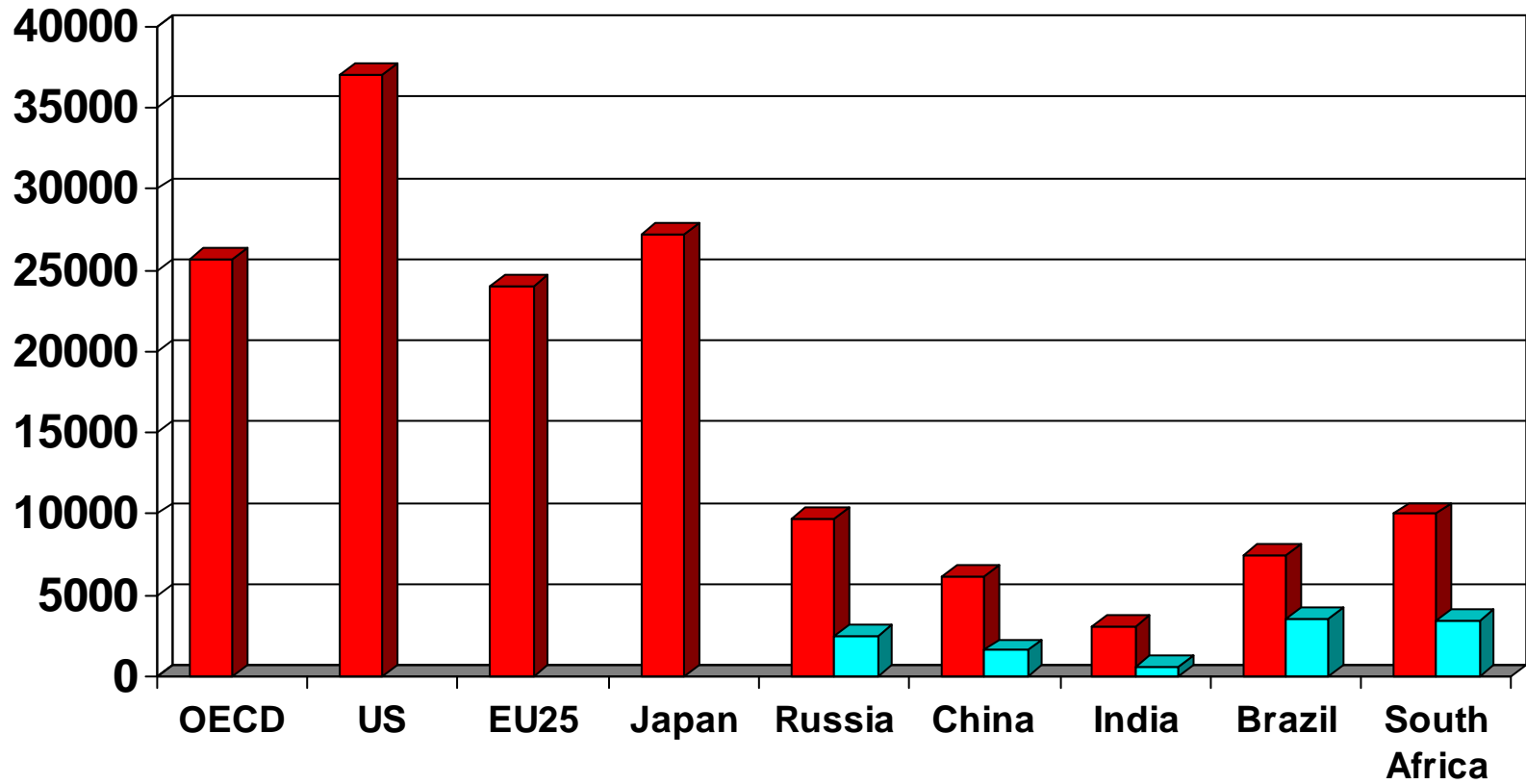


(b) 1751-2007 Cumulative Emissions
(Tons Carbon/Person)



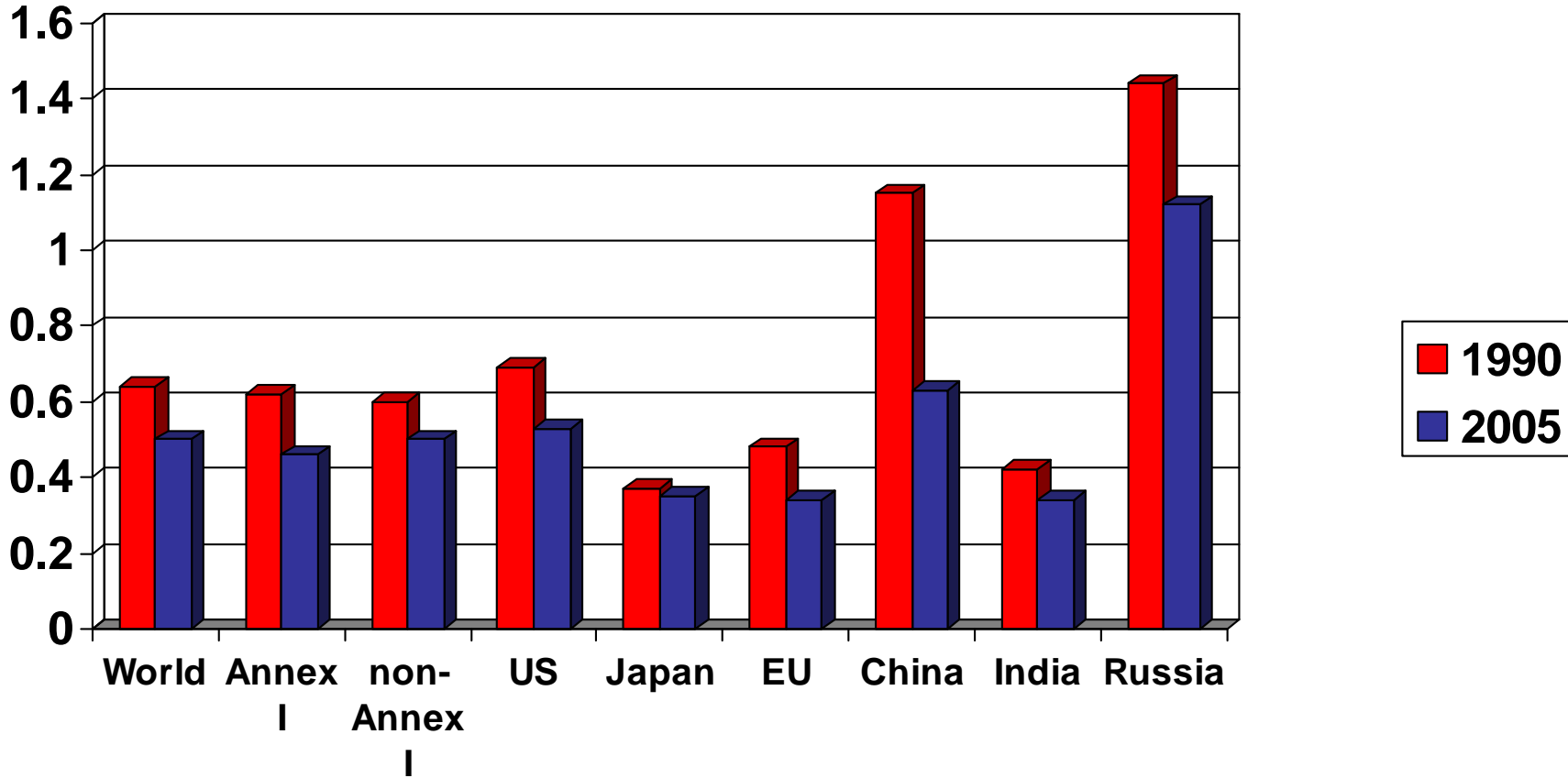


Per capita GDP (in PPP and in real 2000 US\$)





Decarbonisation trend of economic growth (kg CO₂/unit GDP in PPP)



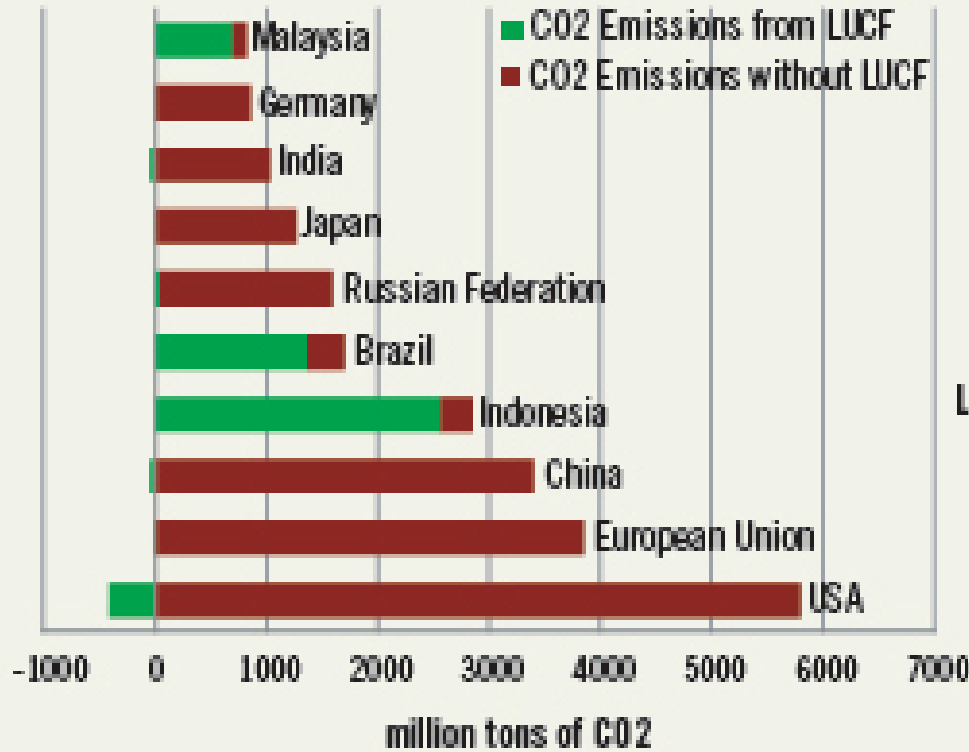
Source: IEA 2007



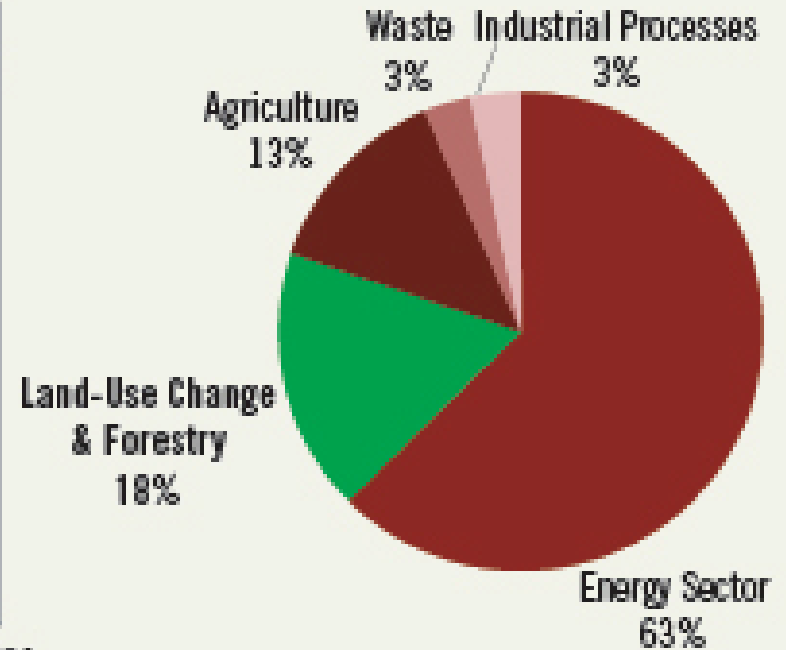


Top CO2 emitters (WRI, 2008)

CO2 Emissions of Top 10 Emitting Countries

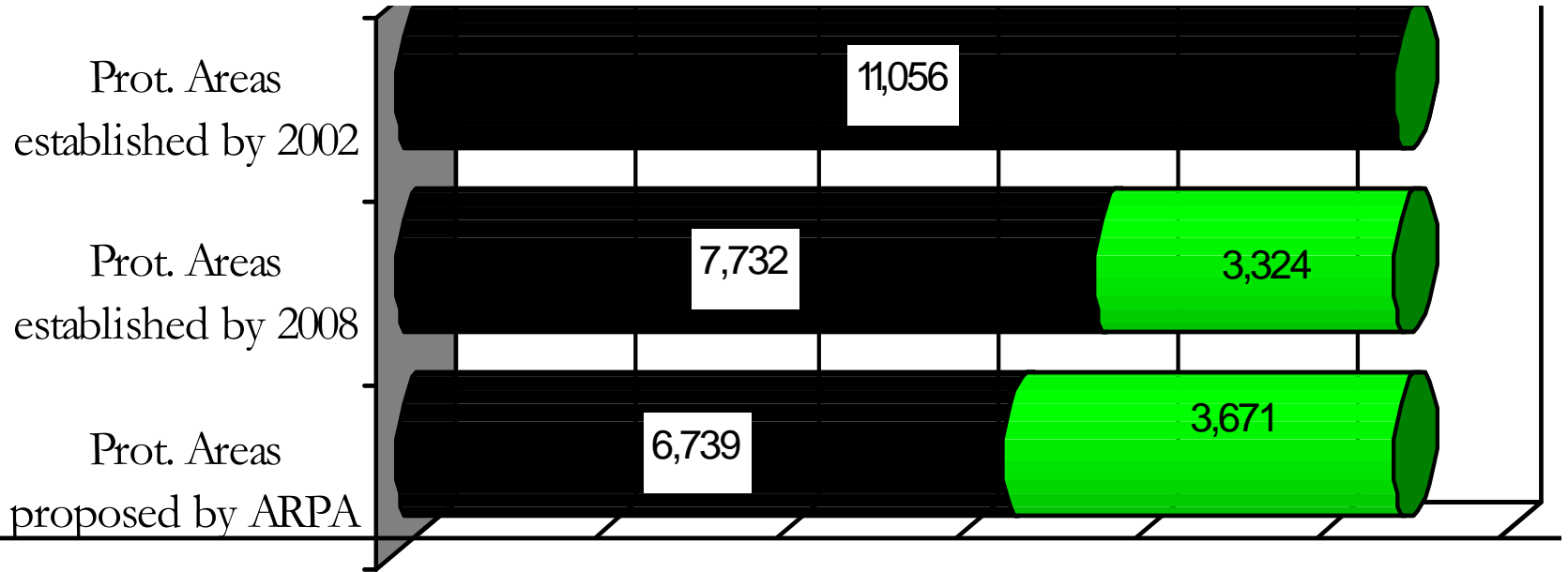


Greenhouse Gas Emissions by Sector





Brazil's ARPA programme is likely to save about 340 Mt CO₂/y between now and 2050



■ Simulated Deforestation by 2050
■ Potential Reduction by 2050





New forest protection laws and incentives

- Brazil sets up domestic REDD fund of 12/15 billion EURO til 2015/20
- Brazil deforestation declined by 60% in Amazone since 2003
- Brazil “commits” to zero net deforestation by 2015 in Amazone (August 2008) – resulting in direct reductions of about 440 Mt CO₂/y from the region
- Indonesia commits to net zero deforestation by 2015 and no conversion of old growth forest into new plantations (IUCN, October 2008) in Sumatra
- Paraguay confirms success of its long term anti-deforestation policy by reducing deforestation from historic 300,000 ha/y (in late '80s) down to <50,000 ha/y in 2004 and commits to zero net deforestation by 2020 (IUCN, October 2008)





Average national coal power efficiency

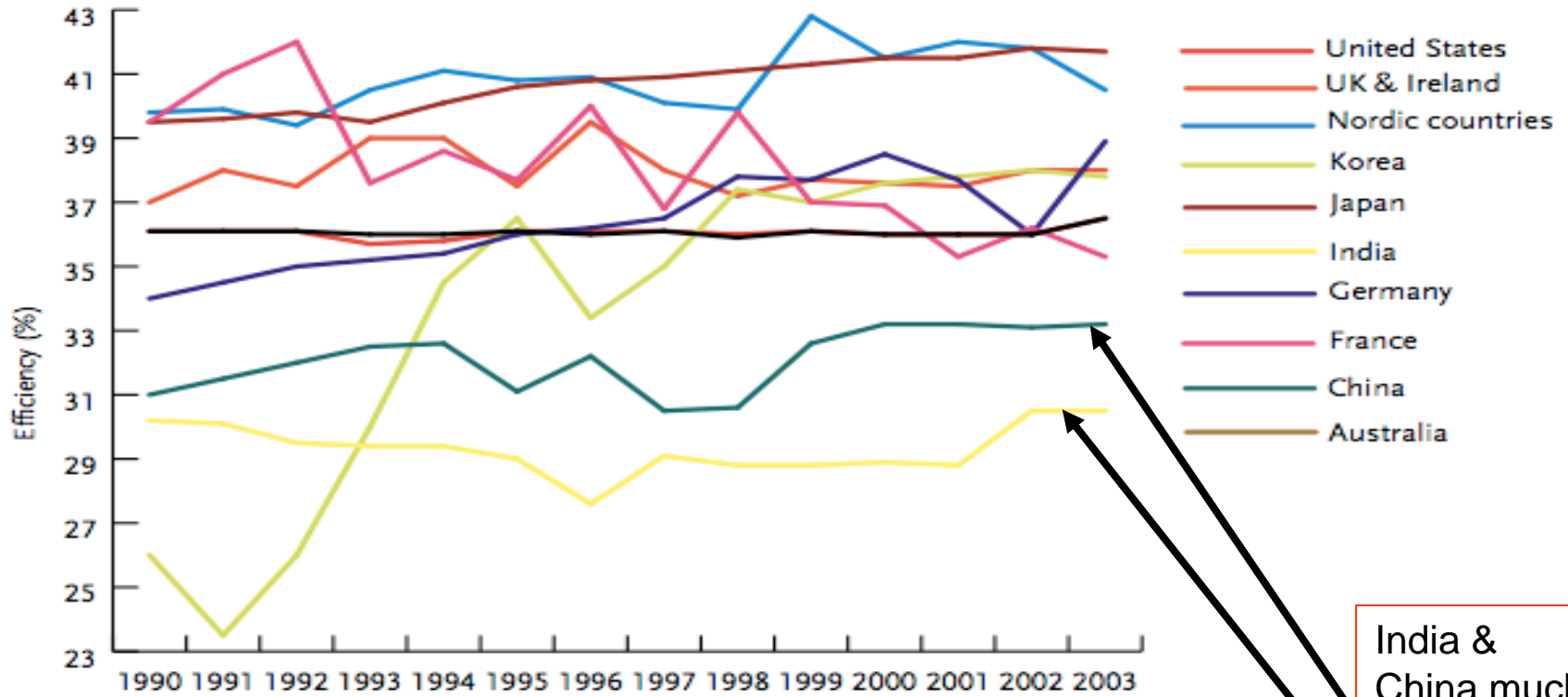


Figure 3.1 Efficiency of coal-fired power production

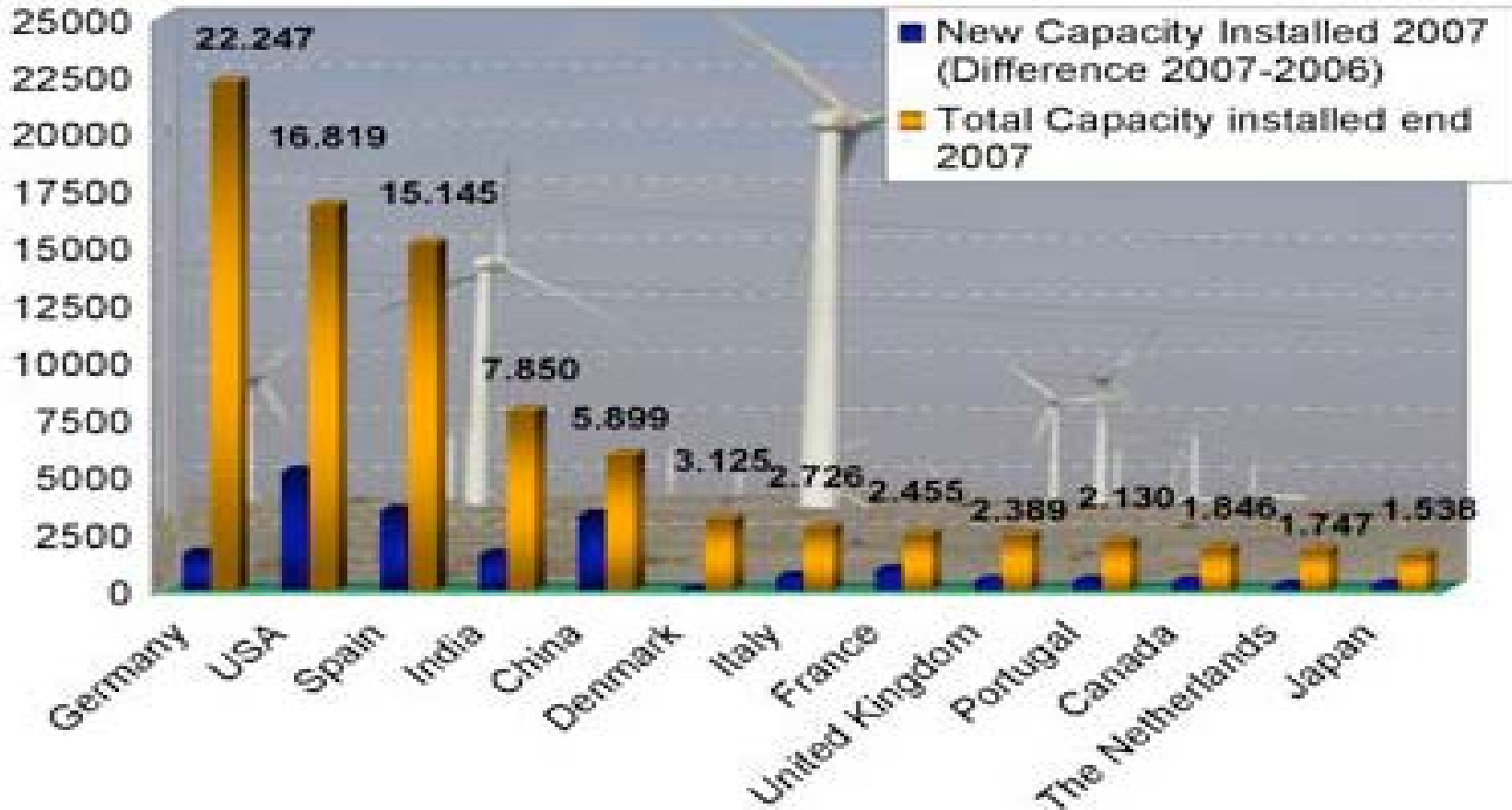
Source: Graus and Worrell, 2006.

India & China much below 45% efficiency





Largest growth in windpower in 2007 in US and China





The RE law in Philippines (August 2008) should result in about 50% RES (33% today) and save about 25-30% of BAU emissions

	2007	2020 (BAU)	2020 (low carbon RE Law)
Coal	28%	50%	23%
Nat Gas	32%	19%	25%
Oil	9%	8%	2%
Hydro	14%	9%	21%
Geothermal	17%	14%	21%
Wind	0.16%	0.30%	5%
Bioenergy	-	-	3%

Don't forget, Philippines phases out "the bulb" by January 2010





China

- Energy efficiency: Improve energy intensity by 20% (2006-2010) and by 50% (2002 – 2020) (spring 2008) – This may result in 550 Mt CO₂ emissions reductions by 2010 (10 measures), and up to 1 Gt CO₂ by 2020
- Renewable energy targets: 10% by 2010, 19% by 2020 (and 30% by 2050) (spring 2008) – This may result in 600 Mt CO₂ avoided by 2010 and up to 1 Gt by 2020
- Coal supply efficiency (without CCS): 330 Mt CO₂ avoided by 2010
- No net deforestation anymore and increase forest area to 20% - resulted in 5.1 Gt CO₂ savings between 1980 and 2006





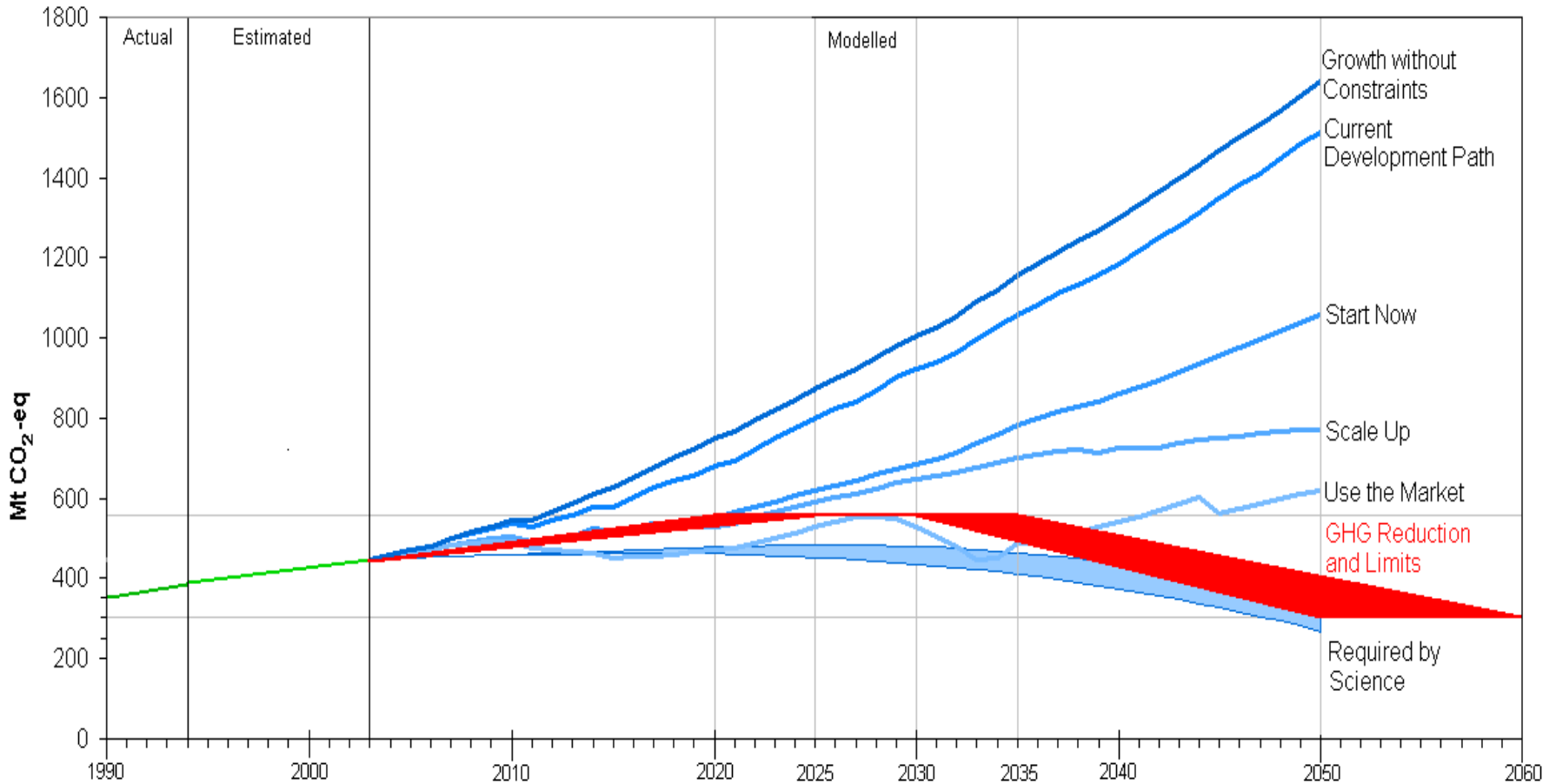
India – ambitious options for the national shareholder dialogue (May 2008)

- Substantively decreasing power grid losses
- Expansion of wind power and bioenergies
- Expansion of small hydropower for remote areas
- Retiring of 10 GW of least efficient coal
- Investment in new and highly efficient coal (SCC and gasification technologies, CCS still unclear)
- Energy efficiency in residential sectors
- Emissions reductions potentials of 600 Mt CO₂/y by 2030 identified in growing industry sectors – energy conservation
- “National Solar Mission” (PV and CSP)





South Africa – the leader in G77 goes ‘peak and decline’ (July 2008)





Climate needs for 2020

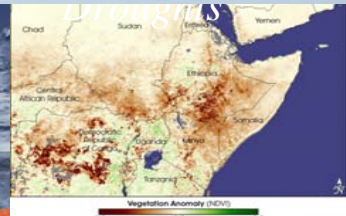
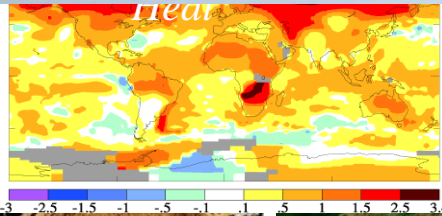
Box 13.7: Reductions Annex I and non-Annex I countries as a group for concentration targets

Scenario category	Region	2020	2050
A-450 ppm CO₂-eq²	Annex I	-25% to -40%	-80% to -95%
	Non-Annex I	Substantial deviation from baseline in Latin America, Middle East, East Asia and Centrally-Planned Asia	Substantial deviation from baseline in all regions
B-550 ppm CO₂-eq	Annex I	-10% to -30%	-40% to -90%
	Non-Annex I	Deviation from baseline in Latin America and Middle East, East Asia	Deviation from baseline in most regions, especially in Latin America and Middle East
C-650 ppm CO₂-eq	Annex I	0% to -25%	-30% to -80%
	Non-Annex I	Baseline	Deviation from baseline in Latin America, Middle East, and East Asia





Wake up - its time for fighting climate change!





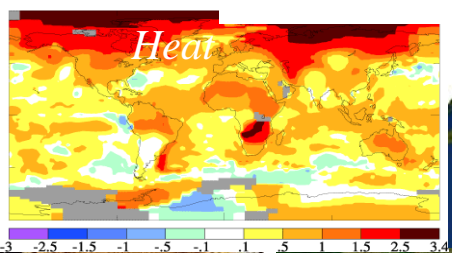
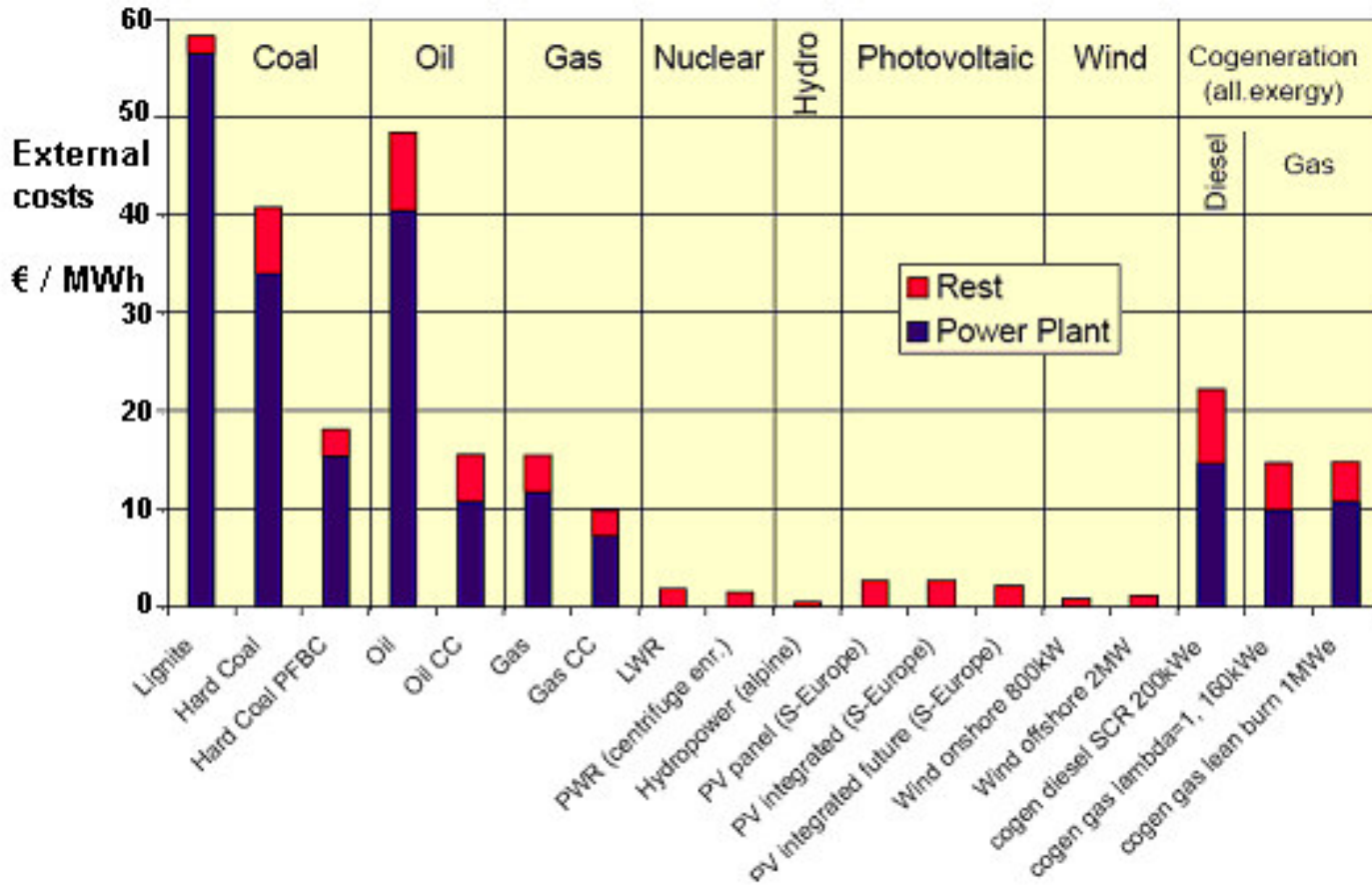
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- Supporting slides



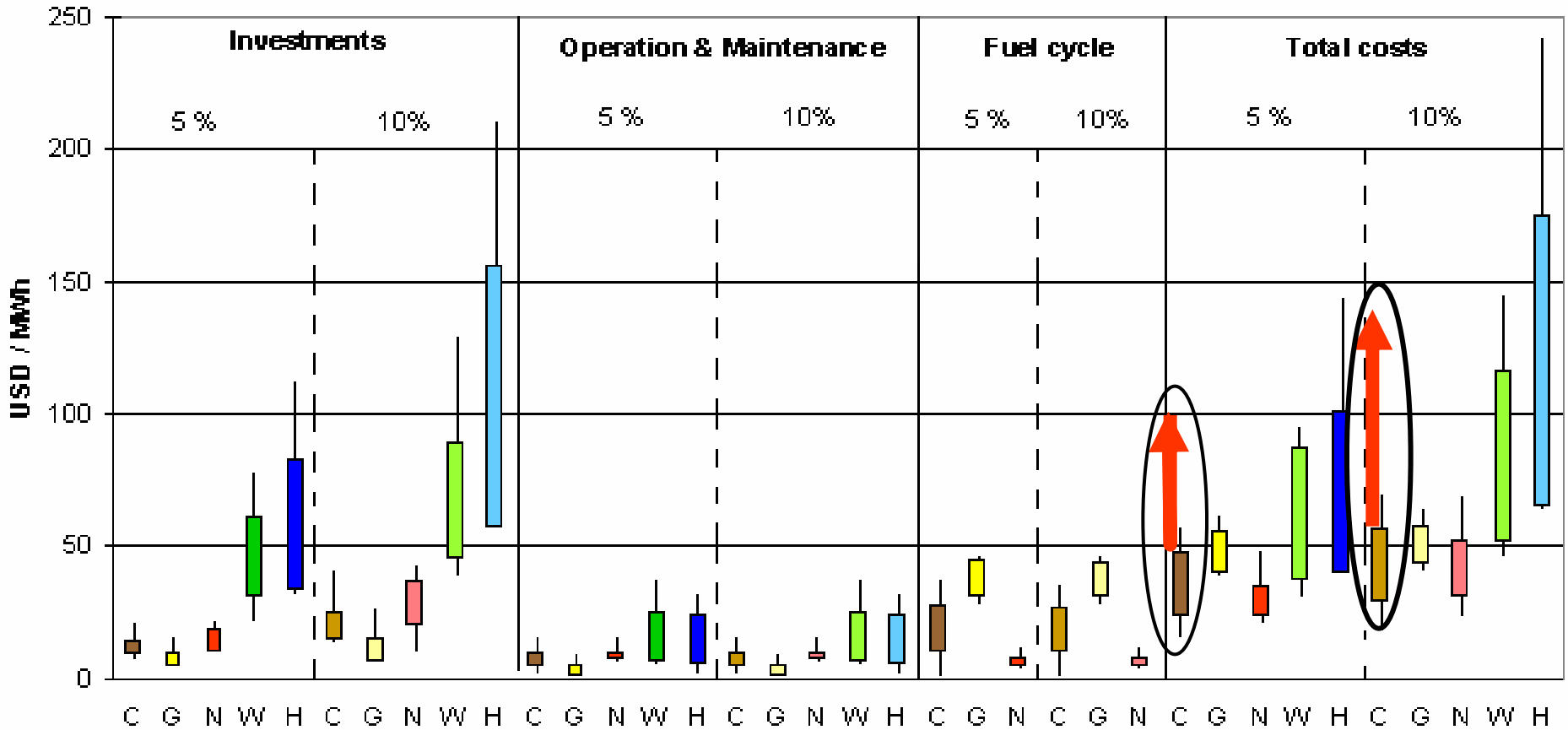


External costs of coal in EU are about same as electricity price for industry





If external costs were included, coal power is more expensive than wind

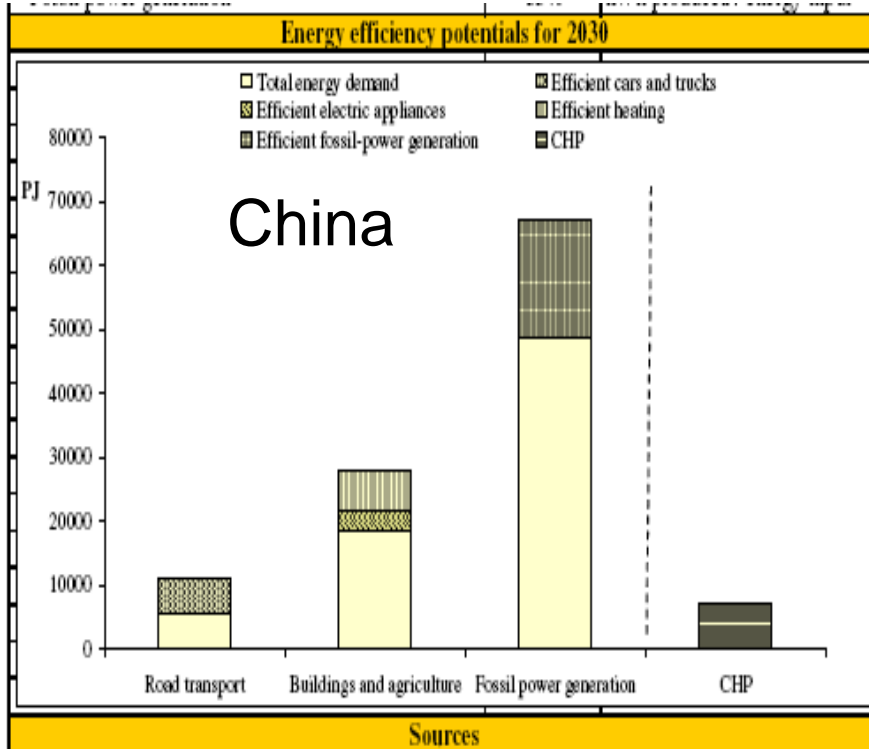


Source: Externe, 2005, IPCC, 2007 – C coal, G gas, N nuclear, W wind, H hydro

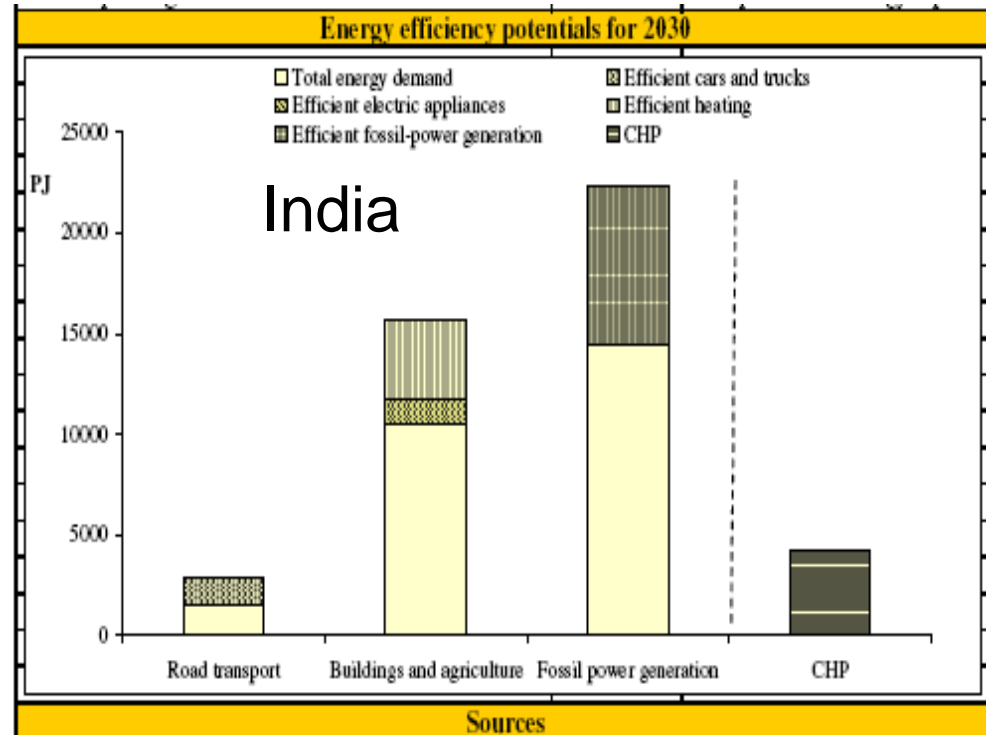




By 2030 China and India can save about 27% and 35% of all fossil electricity produced only by highly-efficient power stations – and much more with CHP



IEA World Energy Outlook 2006
IEA Energy Balances 2006



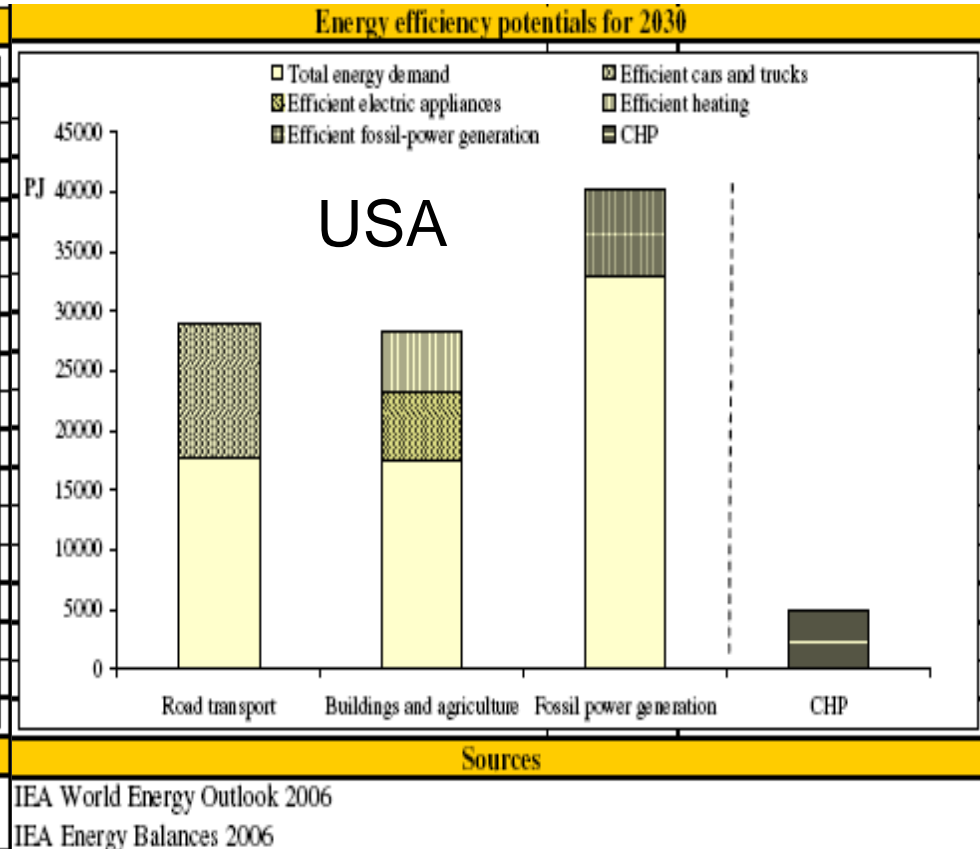
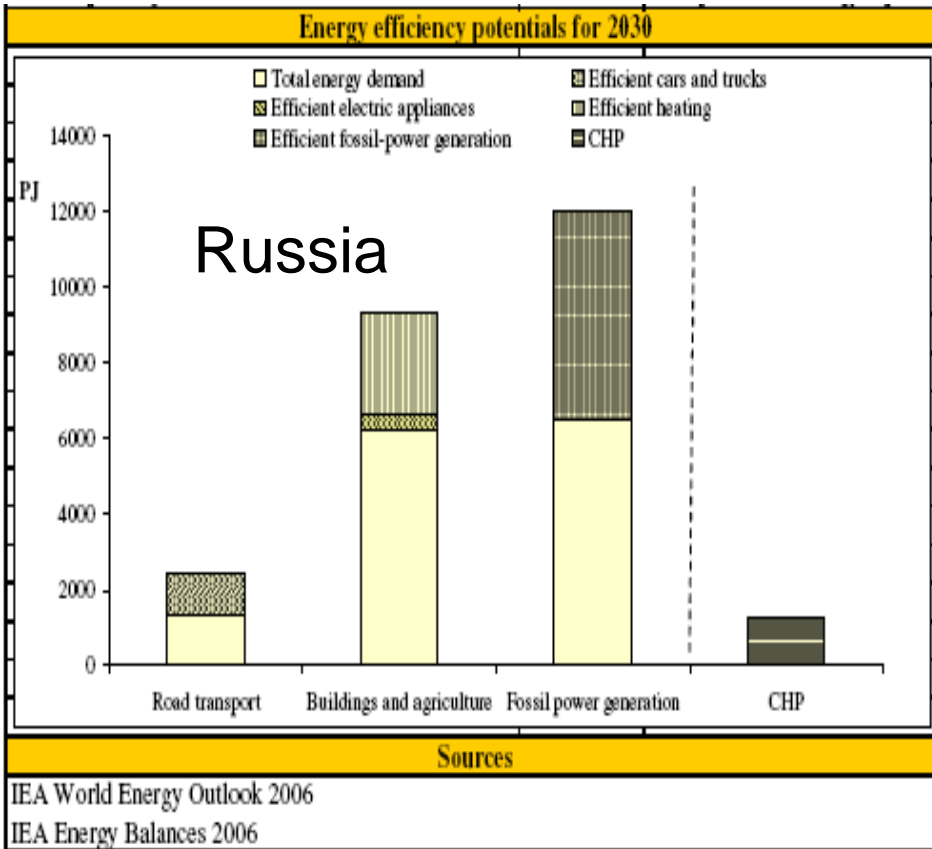
IEA World Energy Outlook 2006
IEA Energy Balances 2006

Source: ECOFYS 2007





By 2030 Russia and USA can save about 45% and 20% of all fossil electricity produced only by highly-efficient power stations – and much more with CHP



Source: ECOFYS 2007

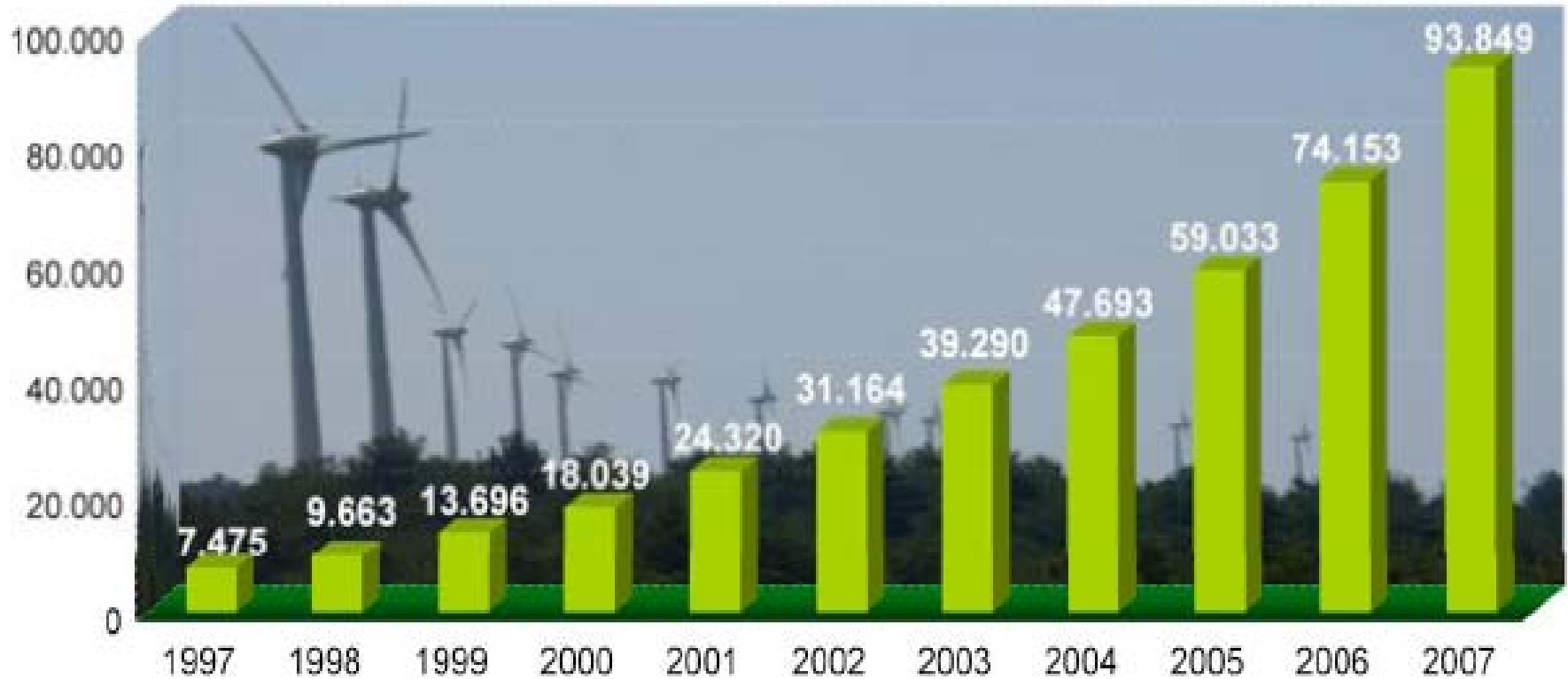




Global windpower – 1.5% of all

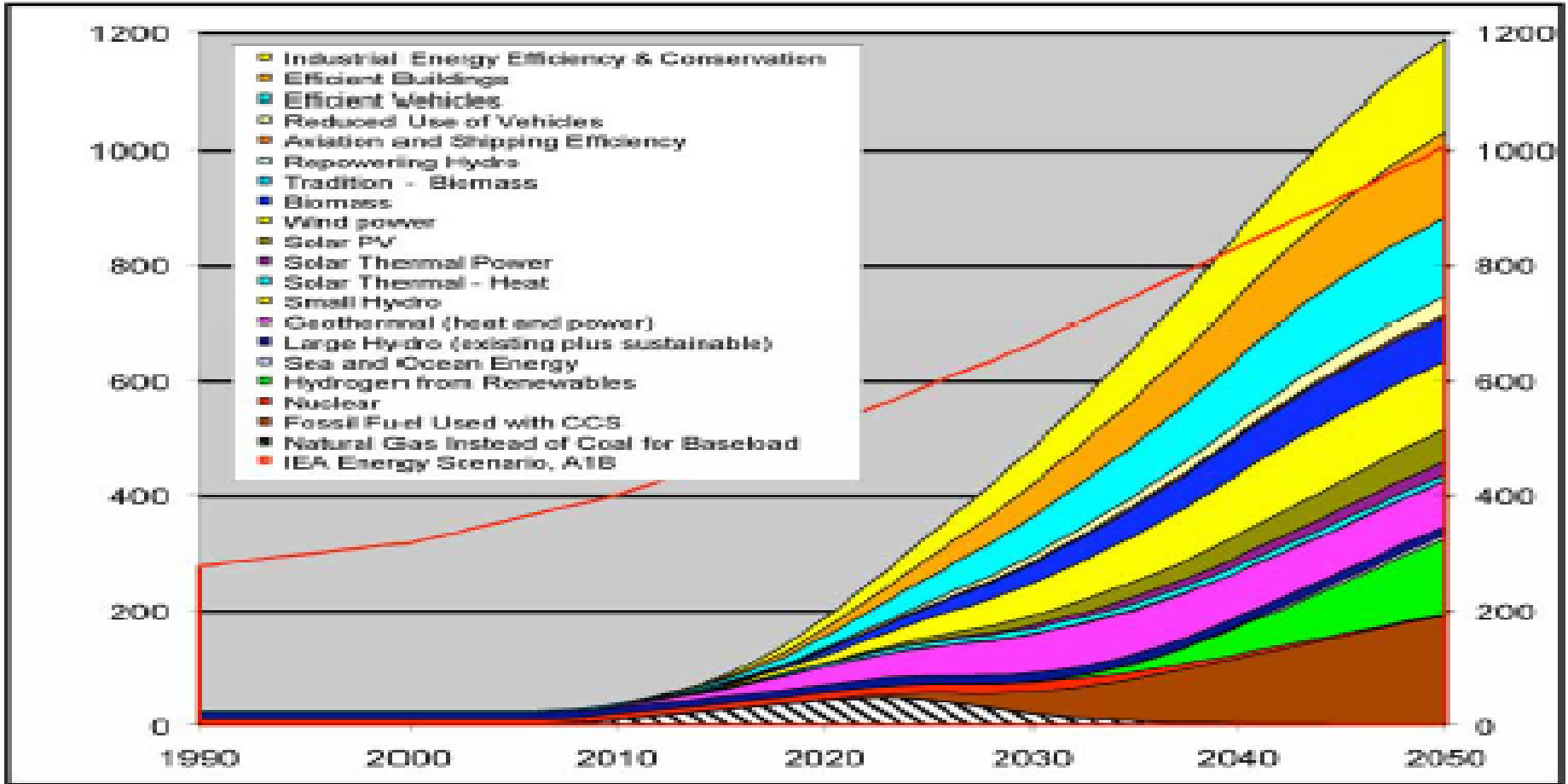


World Wind Energy - Total Installed Capacity [MW] 1997-2007



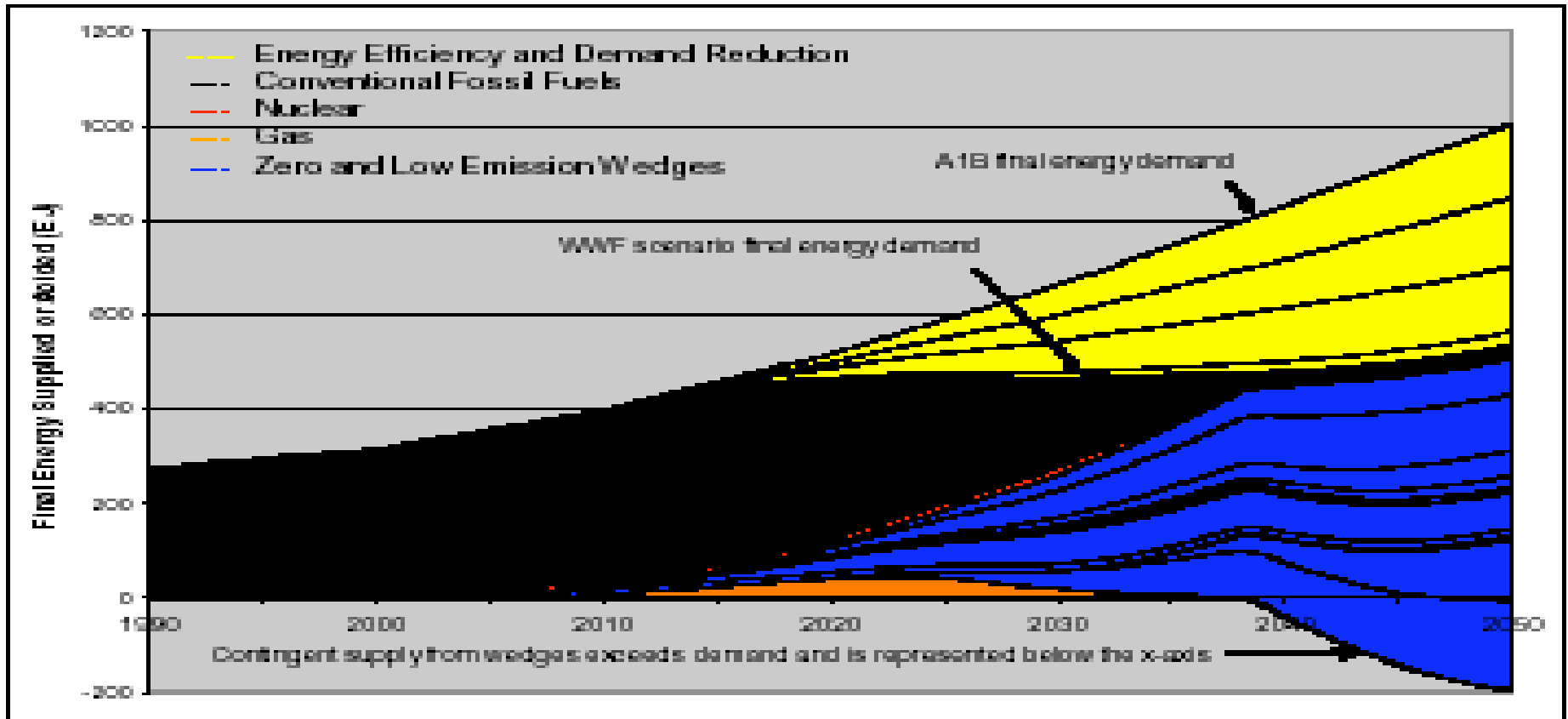


Our climate solution wedges til 2050





Solution wedges: 40% efficiency, 40% renewables, 16% CCS





What does this mean?

- **From 2013 onwards, global GHG emissions need to be reduced by approx. 2.5 Gt CO₂equiv/y til mid century against a BAU scenario – about half of EU's annual emissions**
- **We need to leverage about 500 bln EURO annually (Stern, 2006) from developed nations to help developing nations to decarbonise AND adapt**

