Preventing Carbon Lock-in

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April 2005

Investments Today Drive Impacts Tomorrow

- Investments drive emissions
- Emissions drive concentrations
- Concentrations drive temperature forcing
- Forcing drives impacts

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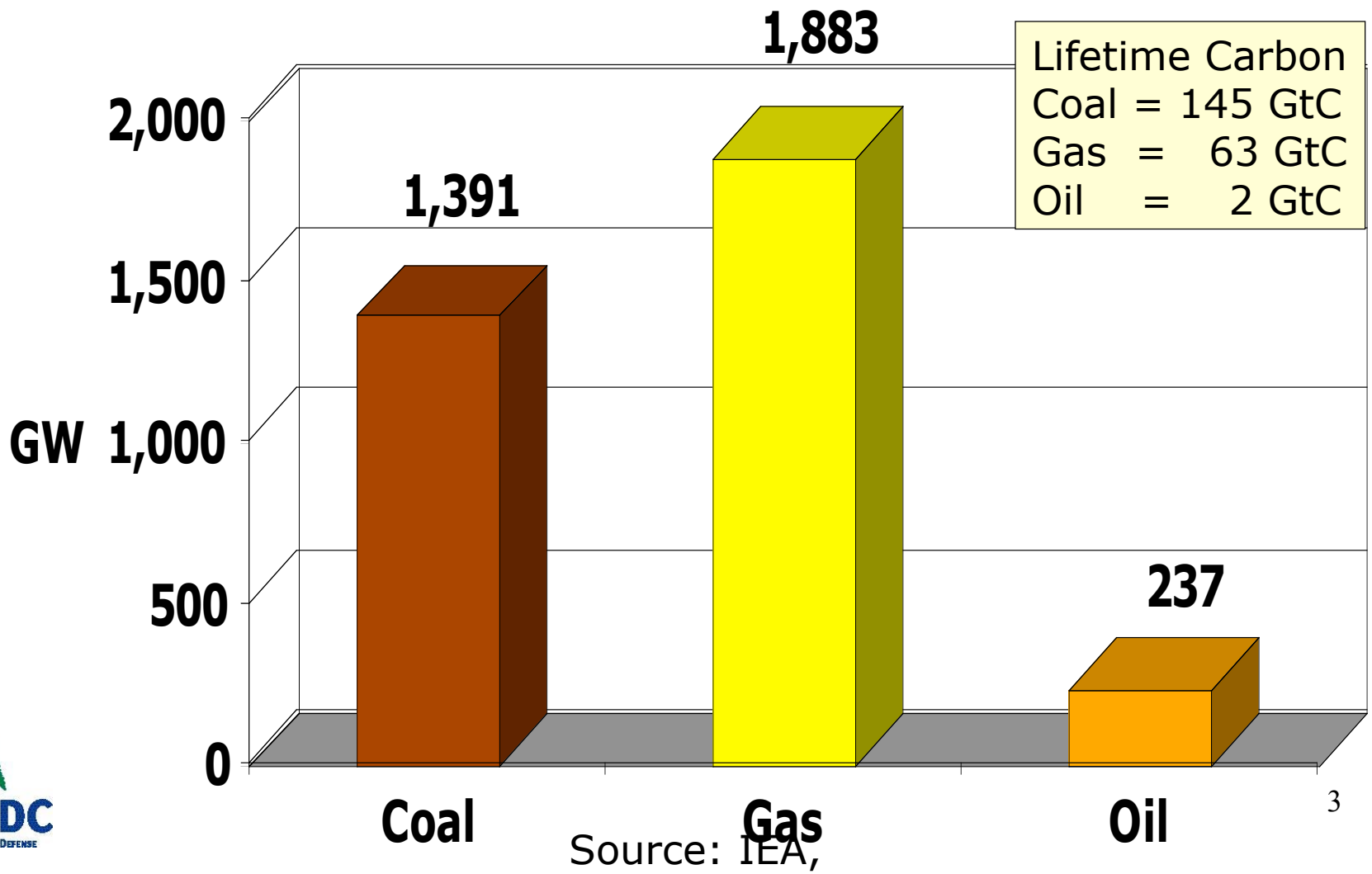
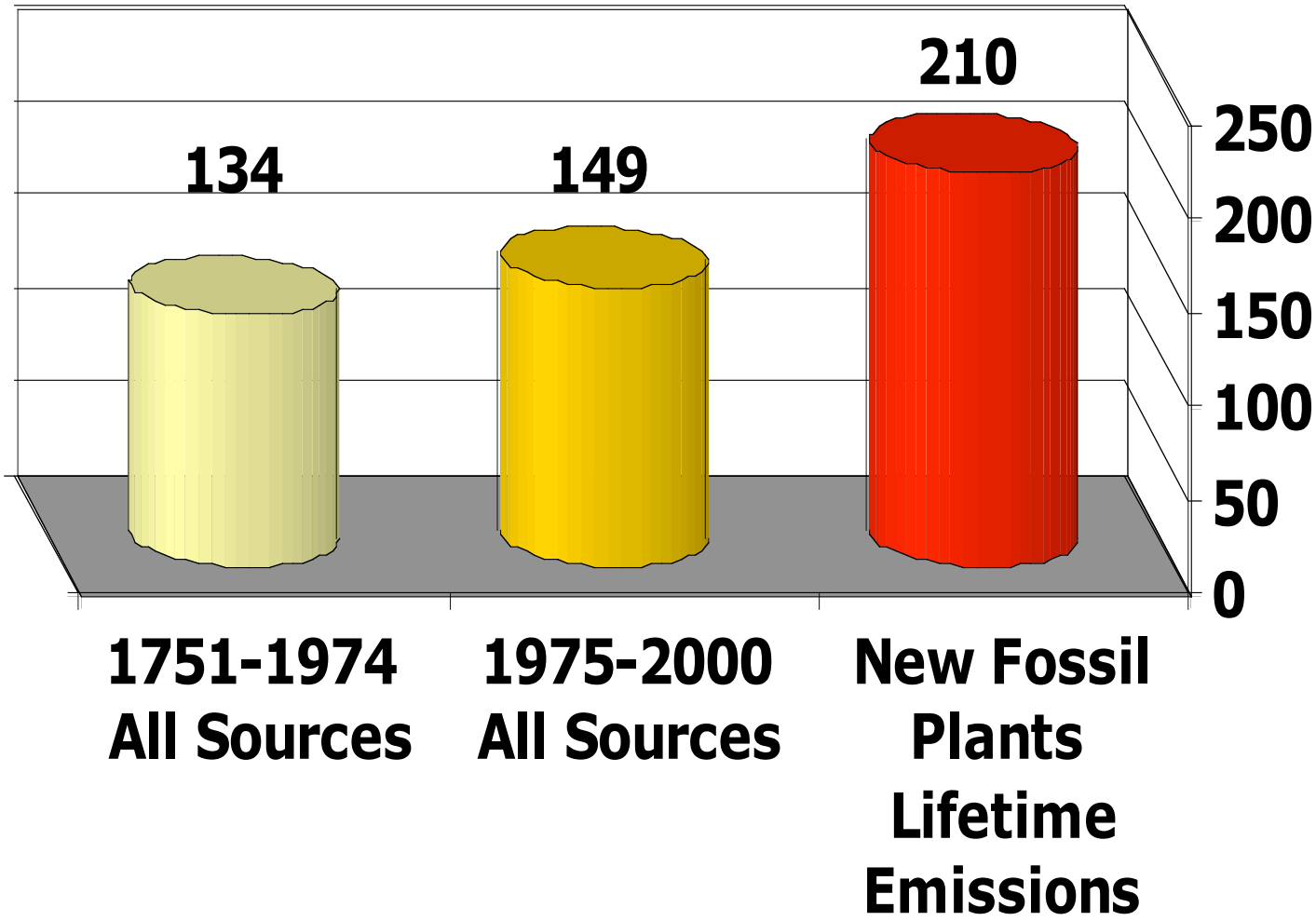
Carbon Lock-in
New Fossil Units 2003-2030



Source: IEA,

New Fossil Plant Emissions Rival Historic Totals



Billion tonnes Carbon

Source: ORNL, CDIAC; IEA, WEO 2004

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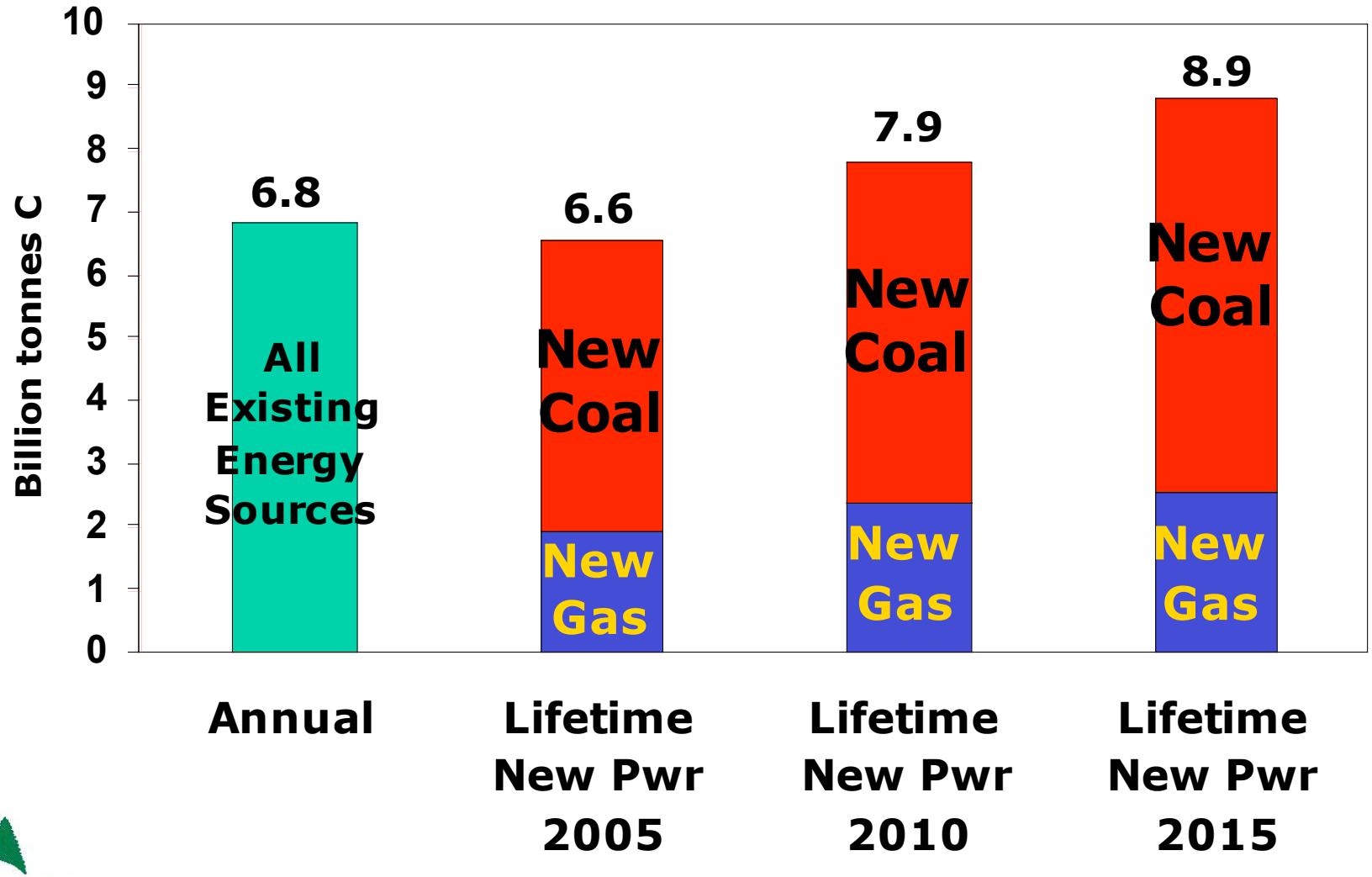
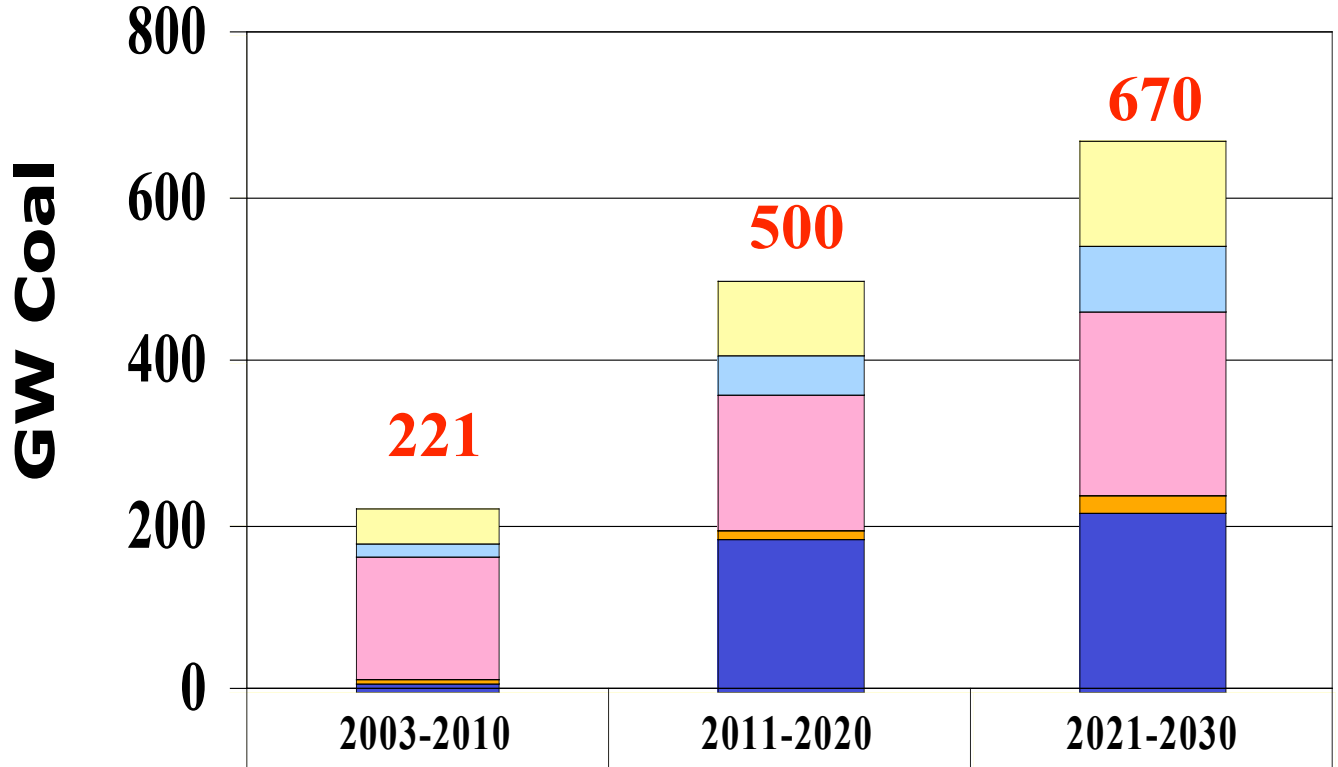
Annual Carbon Commitment

Lifetime Emissions of Annual New Fossil Investment



Source: new fossil capacity, IEA, WEO 2004

New Coal Build by Decade



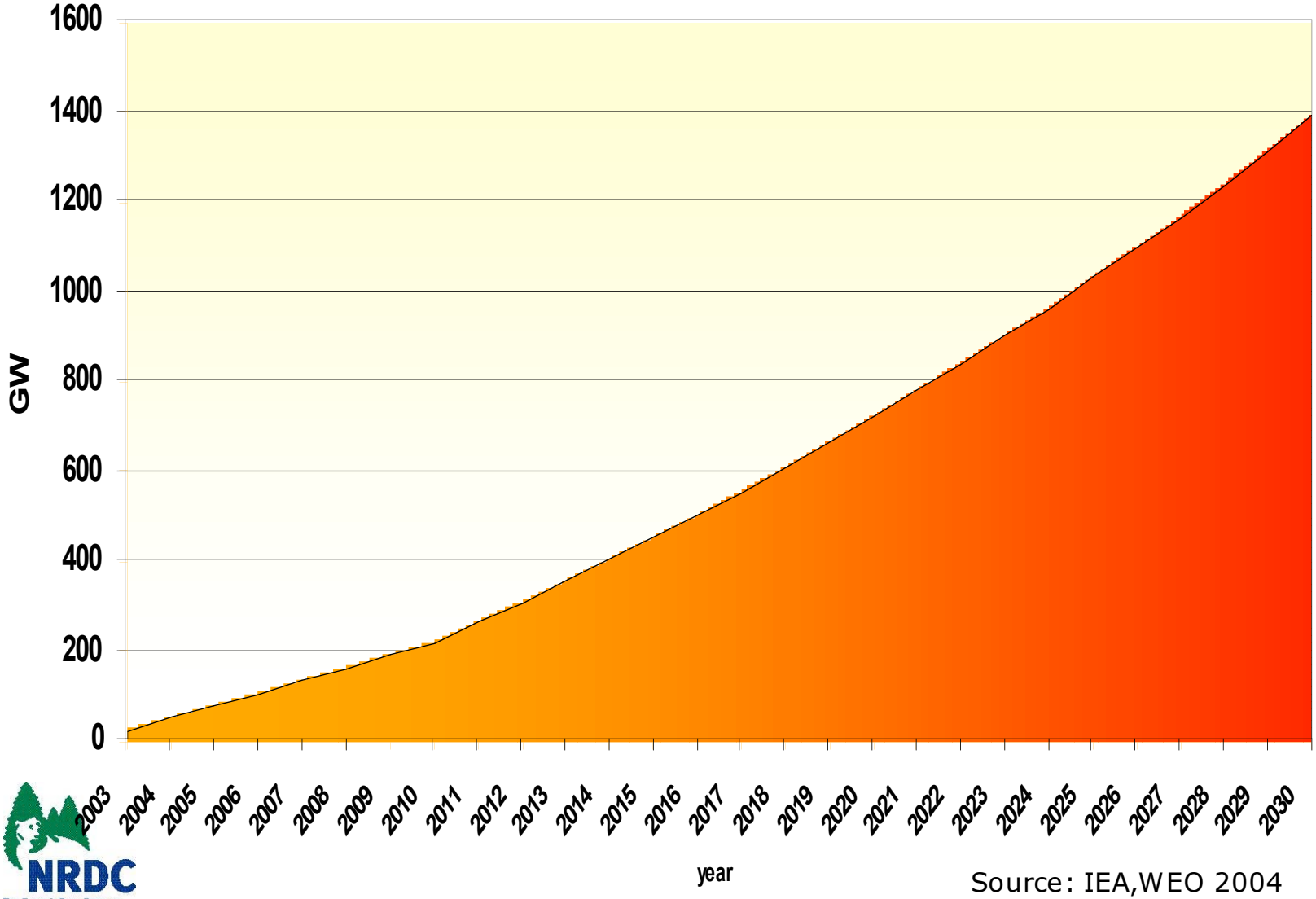
	2003-2010	2011-2020	2021-2030
Other Developing	43	90	128
India	16	48	79
China	150	168	226
Transition	1	11	19

Source: IEA, WEO 2004

Incremental new coal capacity by decade

BAU Means Carbon Lock-In

IEA New Coal Forecast



Source: IEA,WEO 2004

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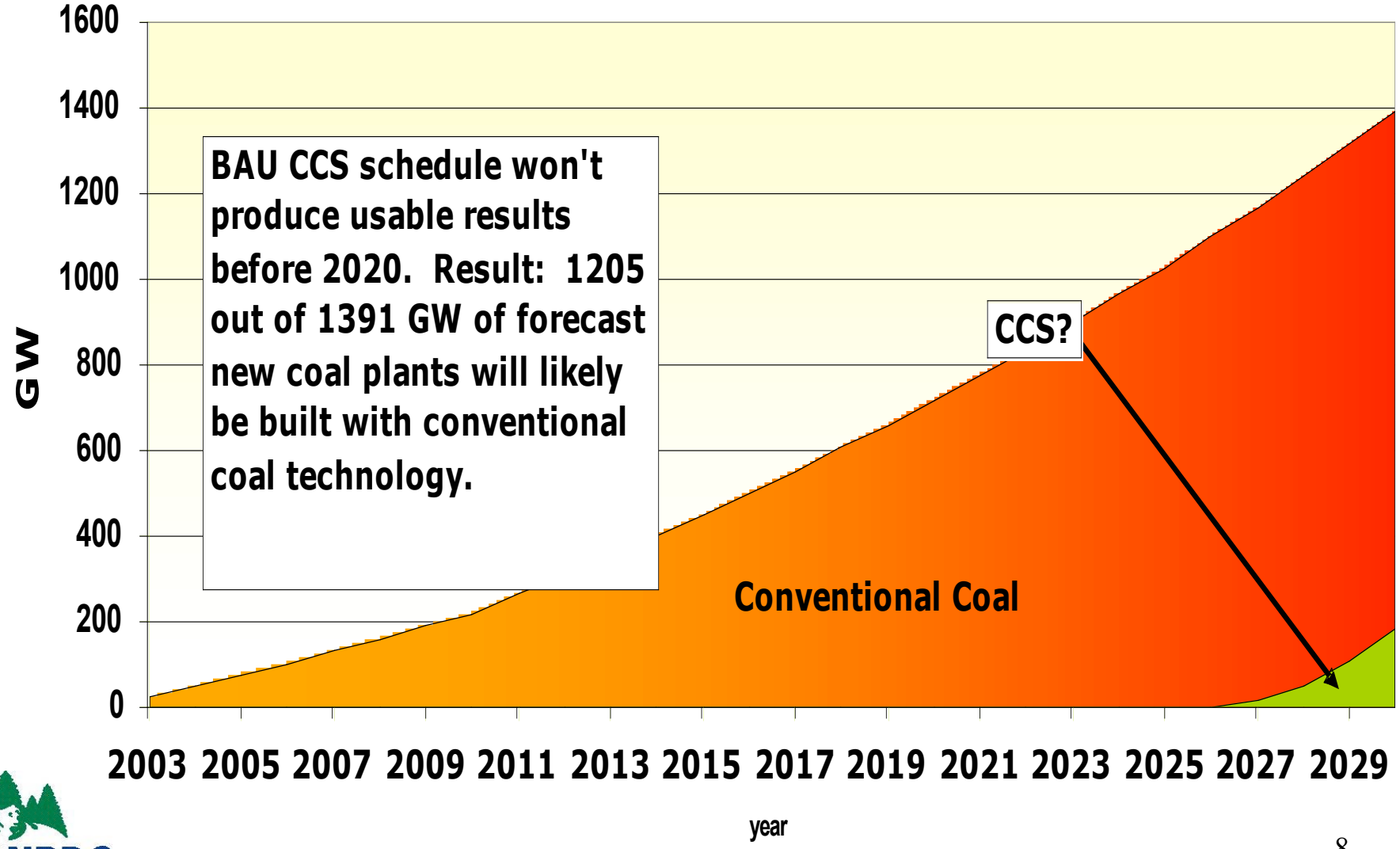
BAU Means Carbon Lock-In

IEA New Coal Forecast



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Combine EERE & CCS to Prevent Lock-In

- IEA Alternative Policy Scenario reduces new coal build with policies to promote energy efficiency and renewable energy.

- CO2 Capture & Storage (CCS) initiative for new coal starting 2011.

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IEA Alt. Policy Scenario

- Efficiency reduces total generation in 2030 by 13%.
- Renewable and nuclear generation in 2030 increase by 37% and 14% respectively.
- This reduces coal generation by 28% and reduces new coal build by 43% from 1391 GW to 793 GW.

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Fund CCS for New Coal in Developing Countries

- Industrialized countries (Annex II, OECD, G8, G8+) agree to finance incremental costs of IGCC with CCS for 10 years (2011-2020) in developing countries.

- Ramp in coverage: 2011=20% of new build; 20% increase each year.

- Cover full incremental cost of electricity (levelized capital and operating costs) for IGCC/CCS to 2020.

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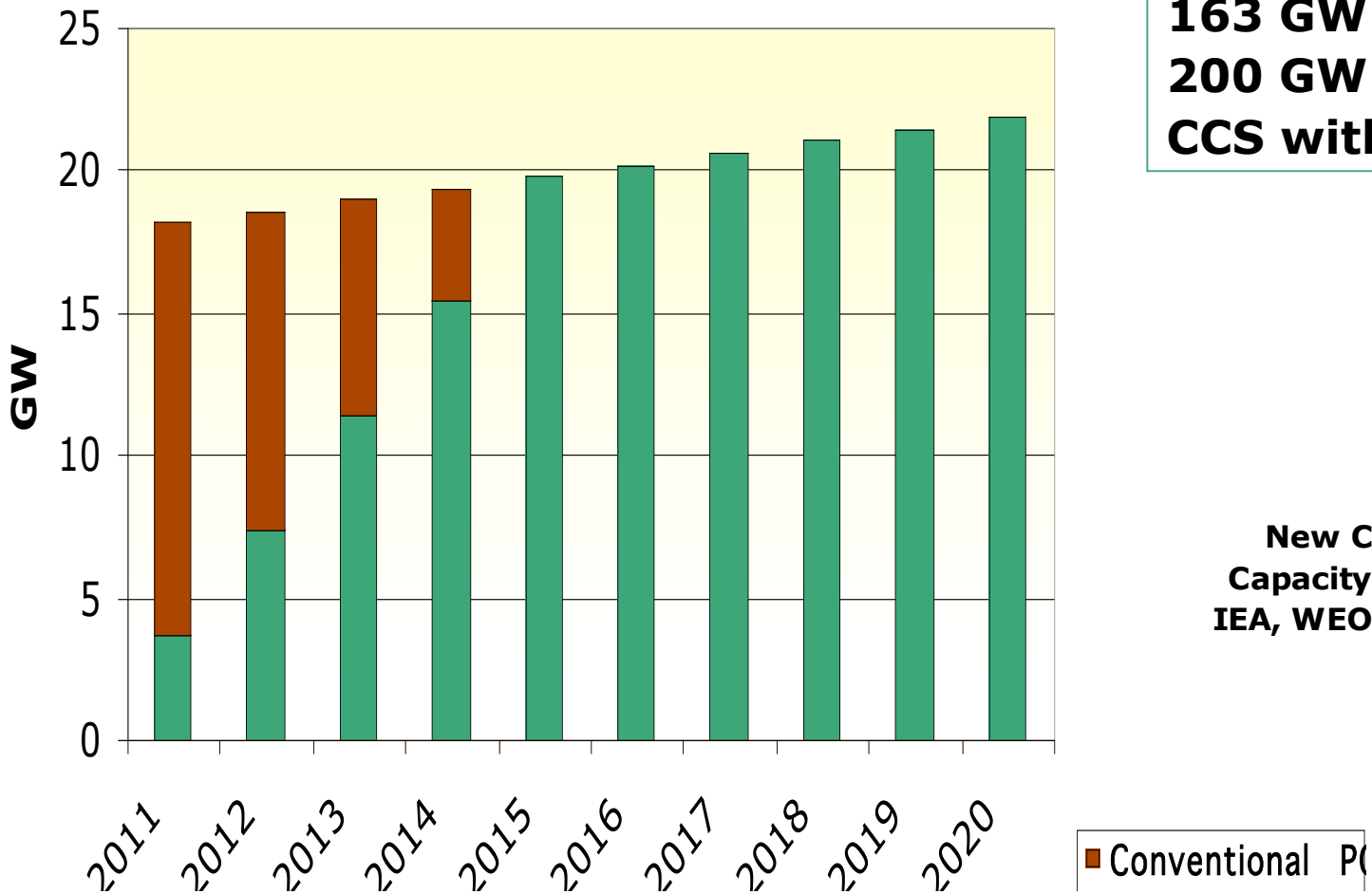
Funding CCS for New Coal in Developing Countries



163 GW out of 200 GW uses CCS with fund

New Coal Capacity from IEA, WEO 2004

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What About Industrialized Countries?

Applying the same CCS deployment schedule in industrialized countries results in an another 33 GW of CCS capacity (out of 41 GW coal forecast).

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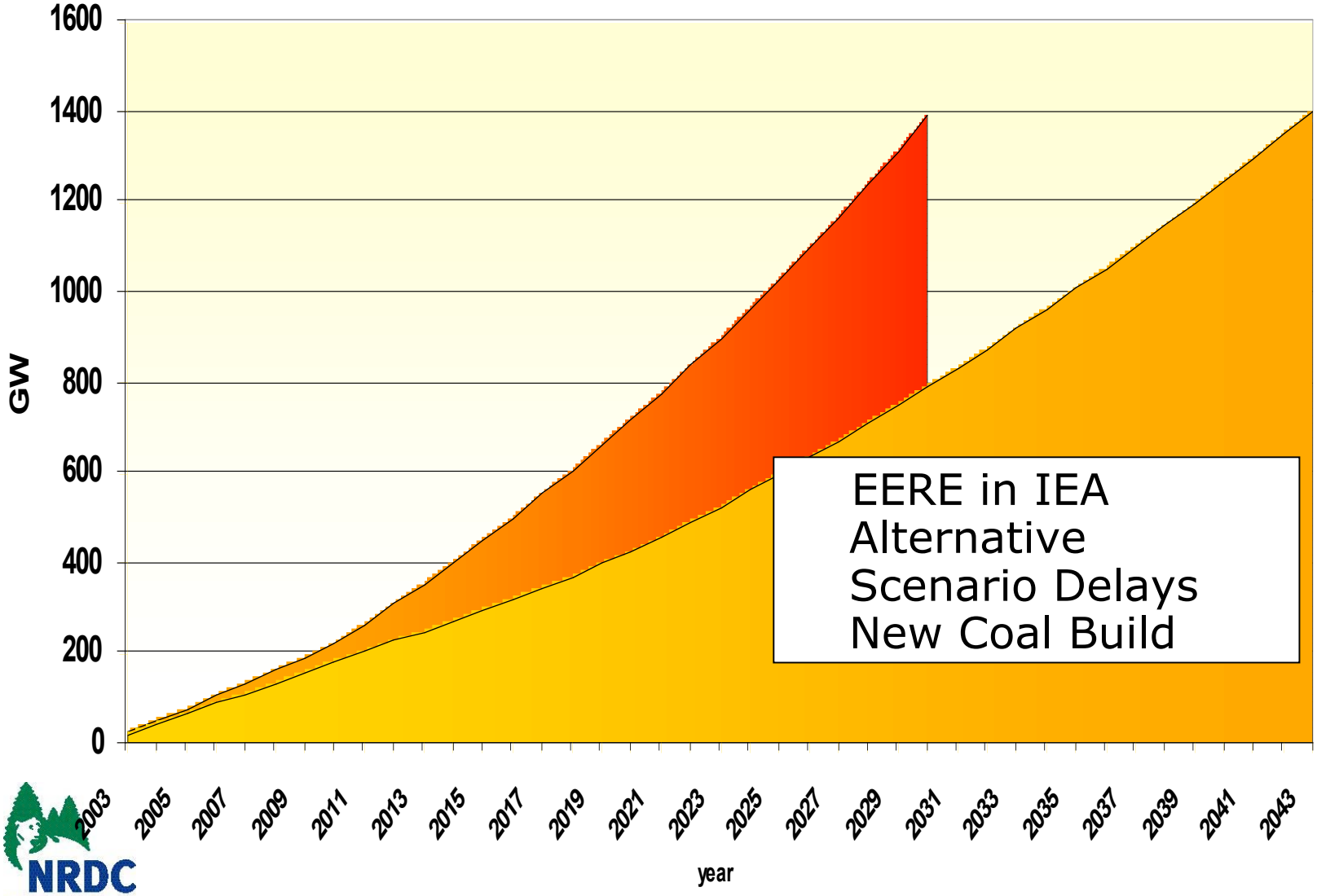
Combining EERE and CCS



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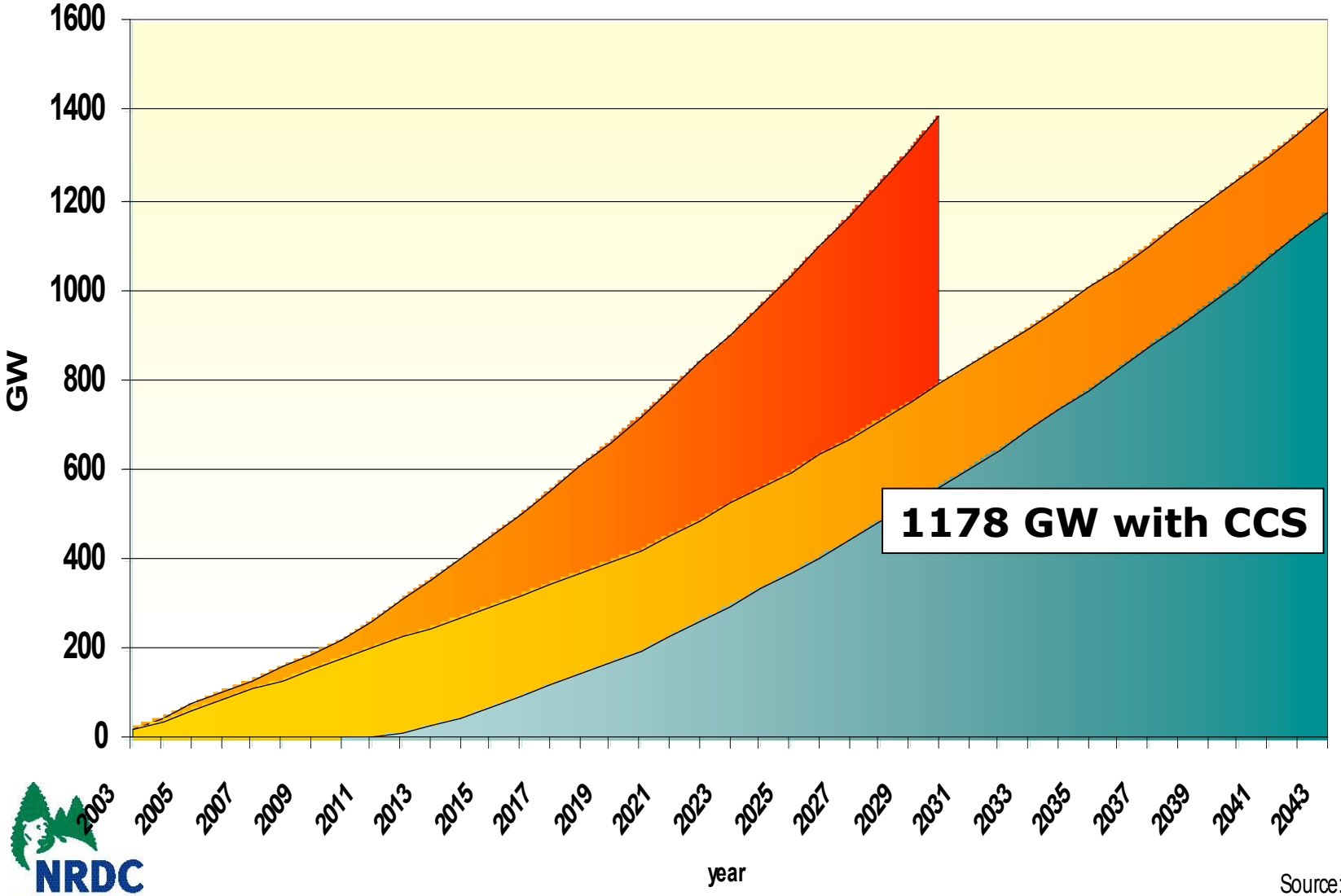
Combining EERE and CCS



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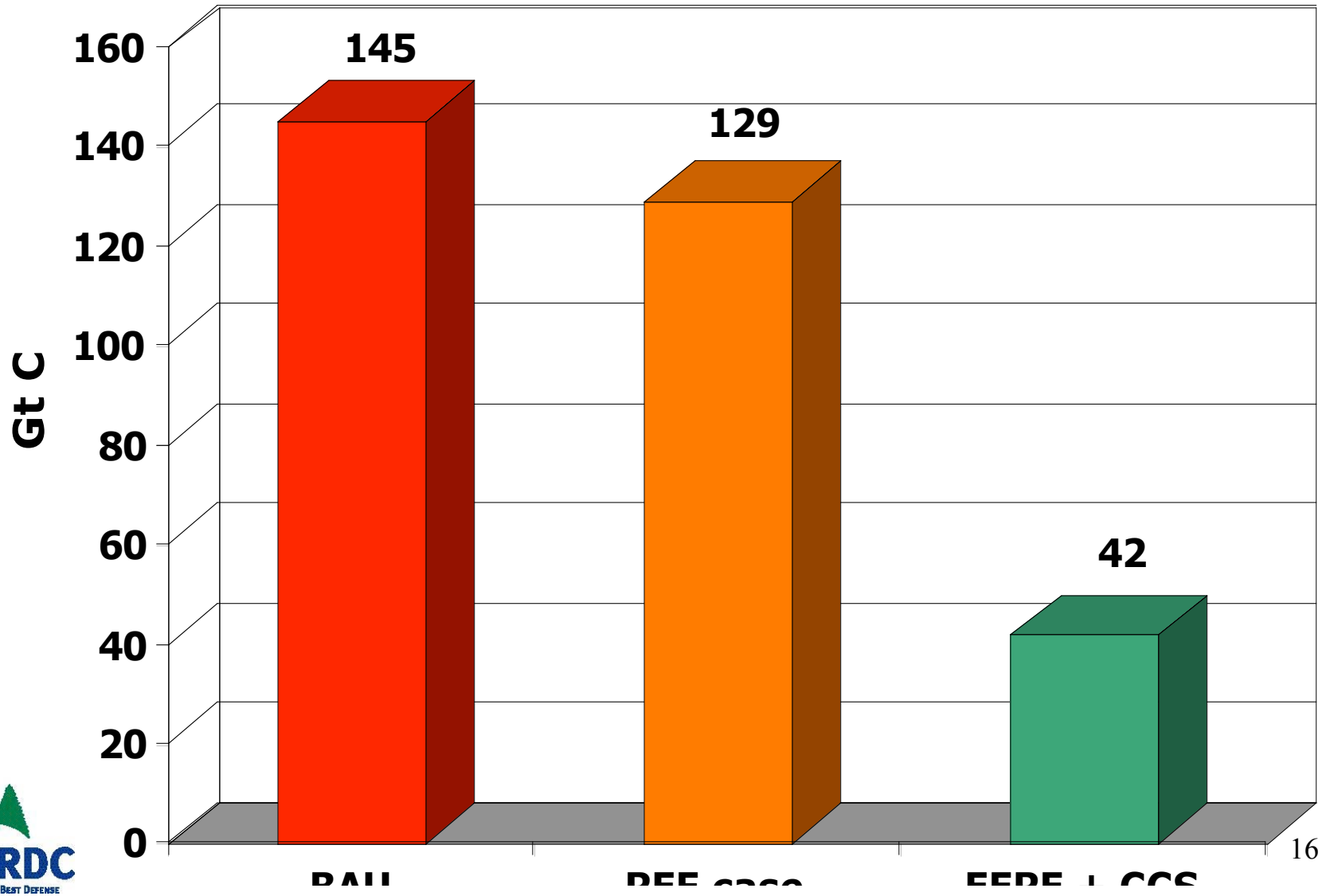
Source: IEA, WEO 2004

Lifetime Carbon From Next 1391 GW Coal



Costs

- IEA: Energy capital costs are the same for reference and alternative scenario. ($2.1 trillion switches from supply to demand side).
- NRDC/Princeton:
  - CCS for LDC 2011-2020 with learning $5.1 billion/year levelized discounted
  - Without learning = $7.6 billion/year.
  - Global program costs = $6.1 billion with learning; $9.2 billion without learning.

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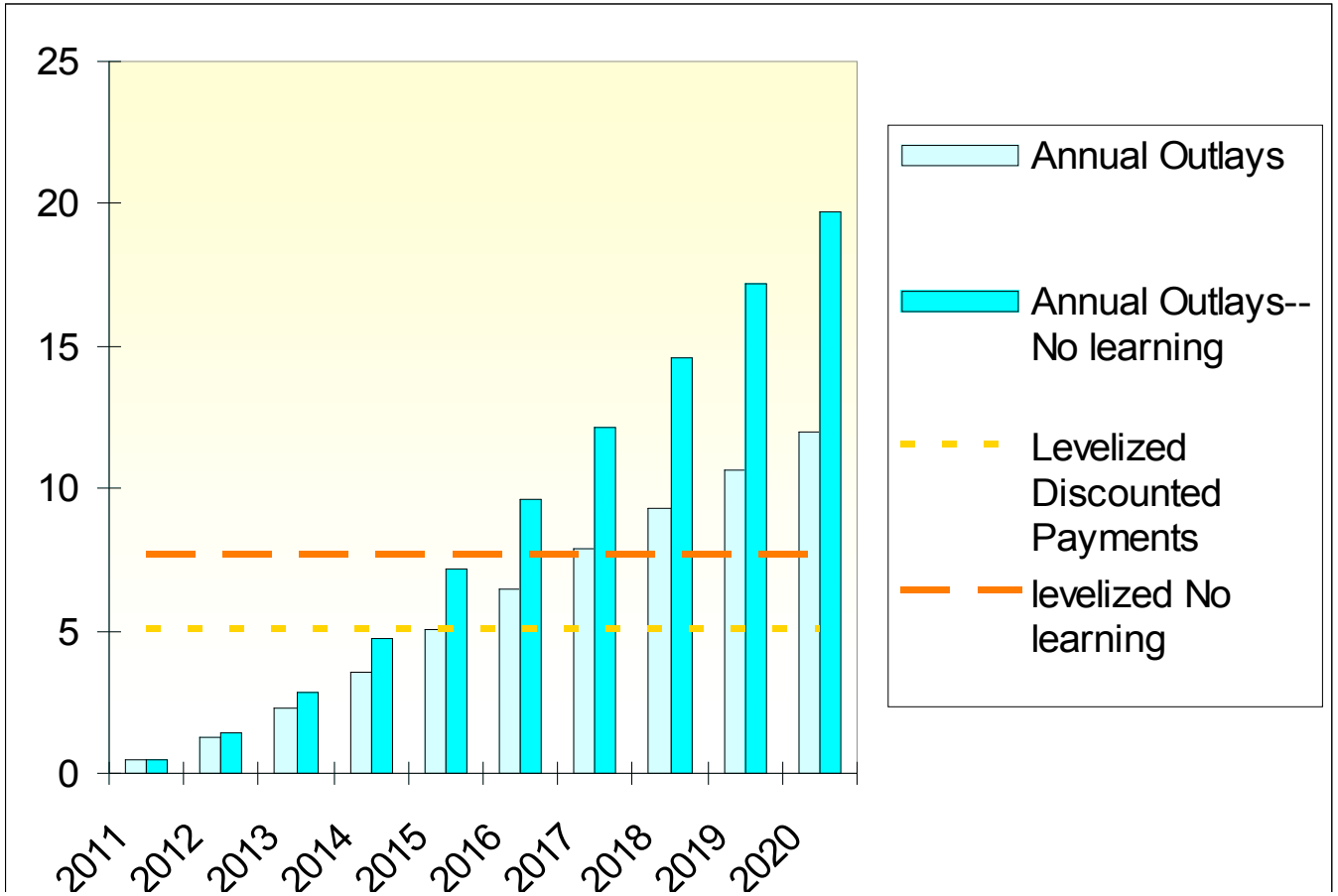
Costs of CCS Fund

- Levelized discounted costs = $5-7.6 billion/yr
- Compare 2003 G7 ODA = $50 billion
- But compare GEF = $3 billion for four yrs.



Costs derived from Foster Wheeler Study for IEA GHG Programme, May 2003

More on Costs

- $5.1-7.6 billion LDC program = 0.4-0.6 mills/kwh if applied to OECD generation. (learning v. no learning).
- $6.1-9.2 billion global program = 0.5-0.8 mills/kwh. (learning v. no learning).

- CCS program costs are significantly less with EERE programs implemented. Without EERE, CCS for LDC costs $7.7-12 billion/year and global CCS program costs $12.6-18.9 billion/yr. (learning v. no learning).

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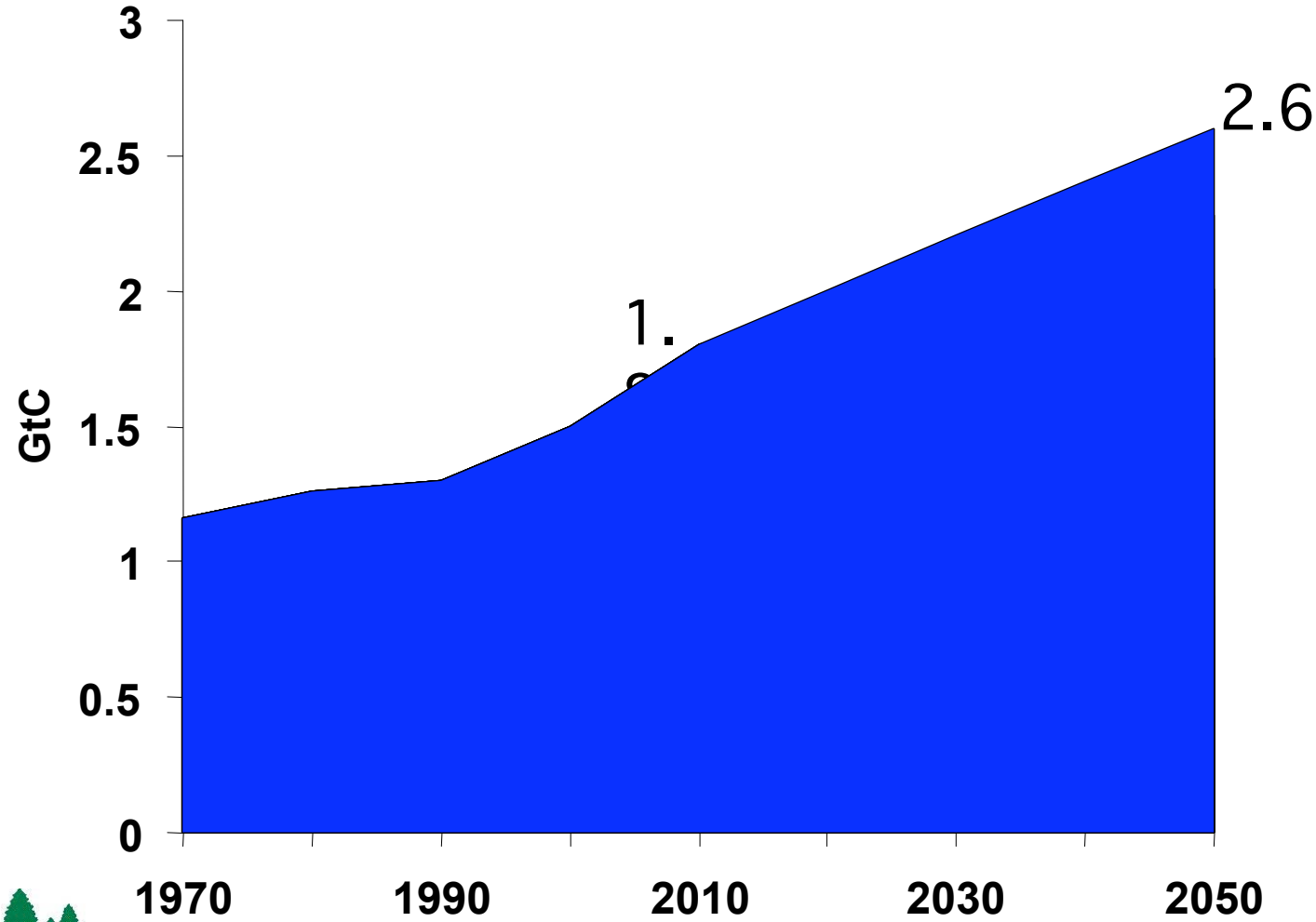
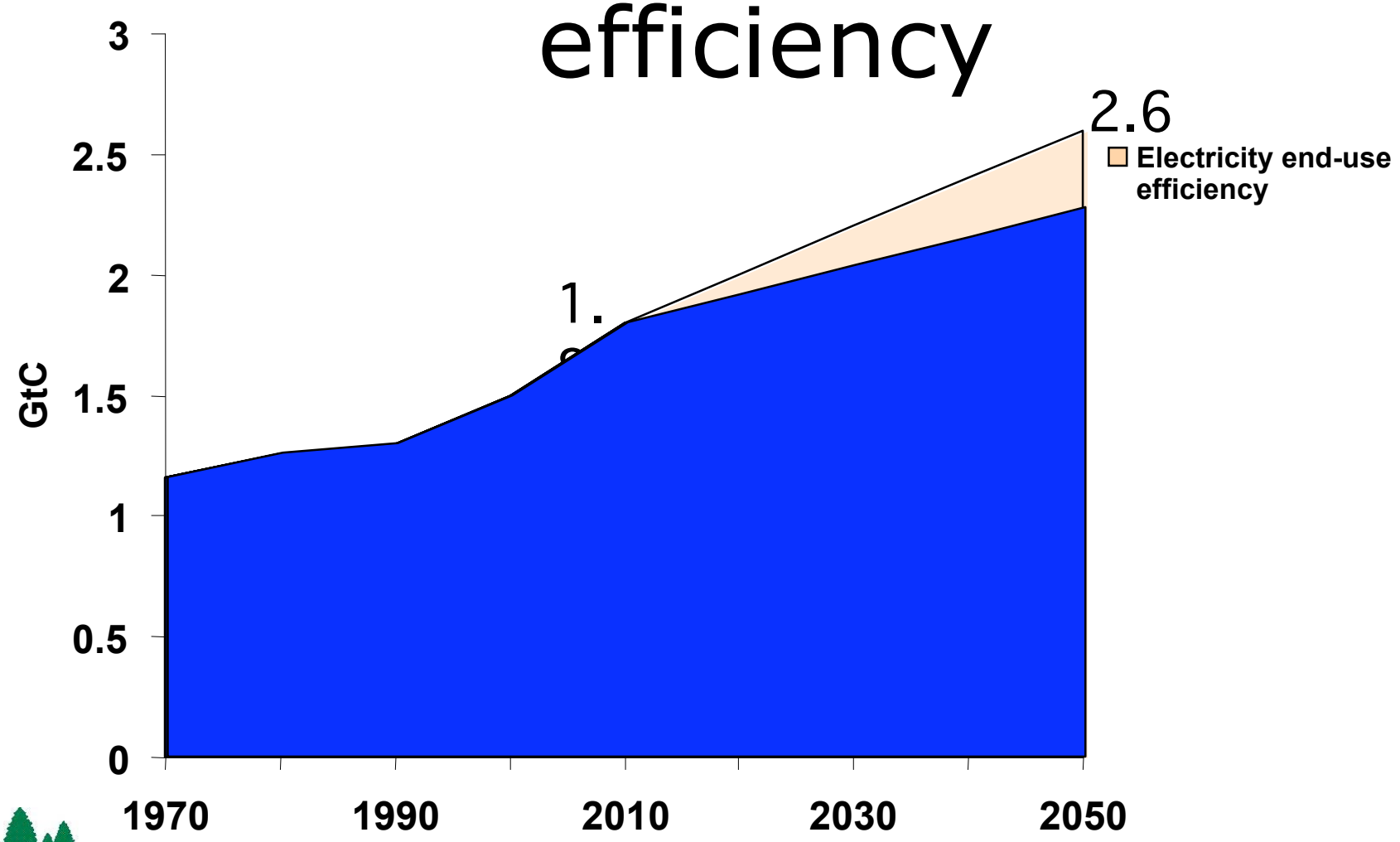
U.S. Emissions: Business as Usual



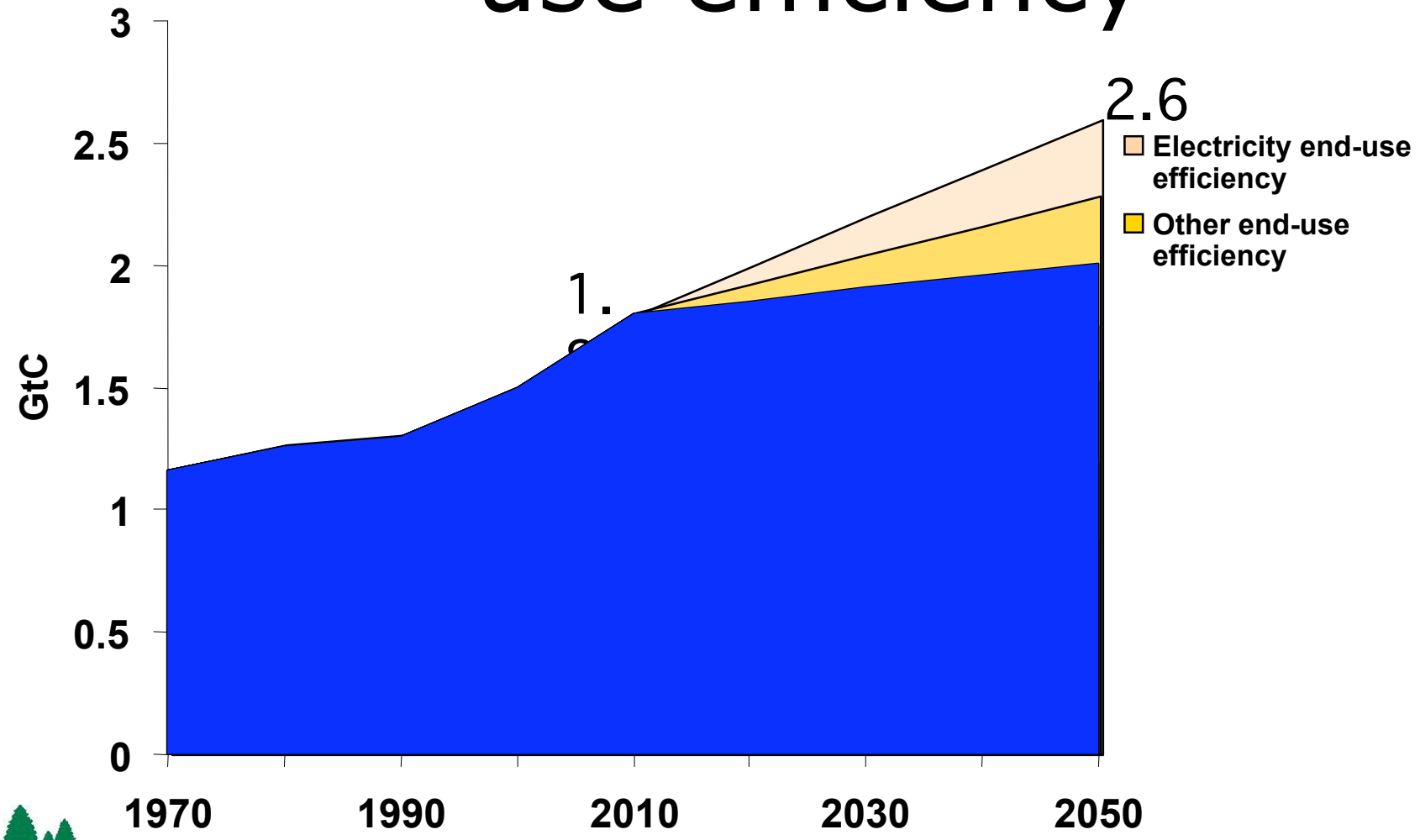
After Pacala and Socolow, 2004; ARI CarBen3

U.S. Emissions: Electricity efficiency



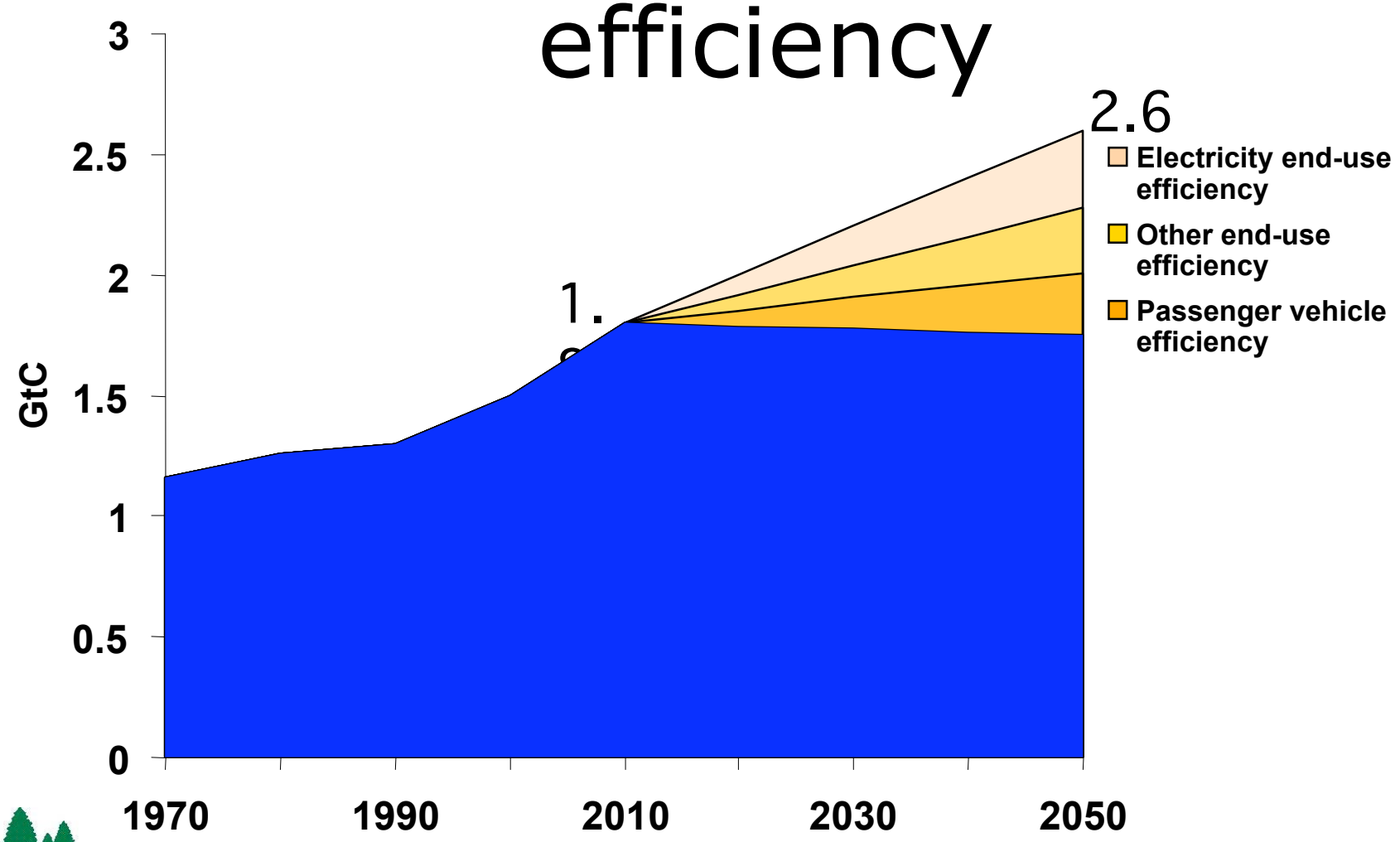
After Pacala and Socolow, 2004; ARI CarBen3

U.S. Emissions: Other end-use efficiency



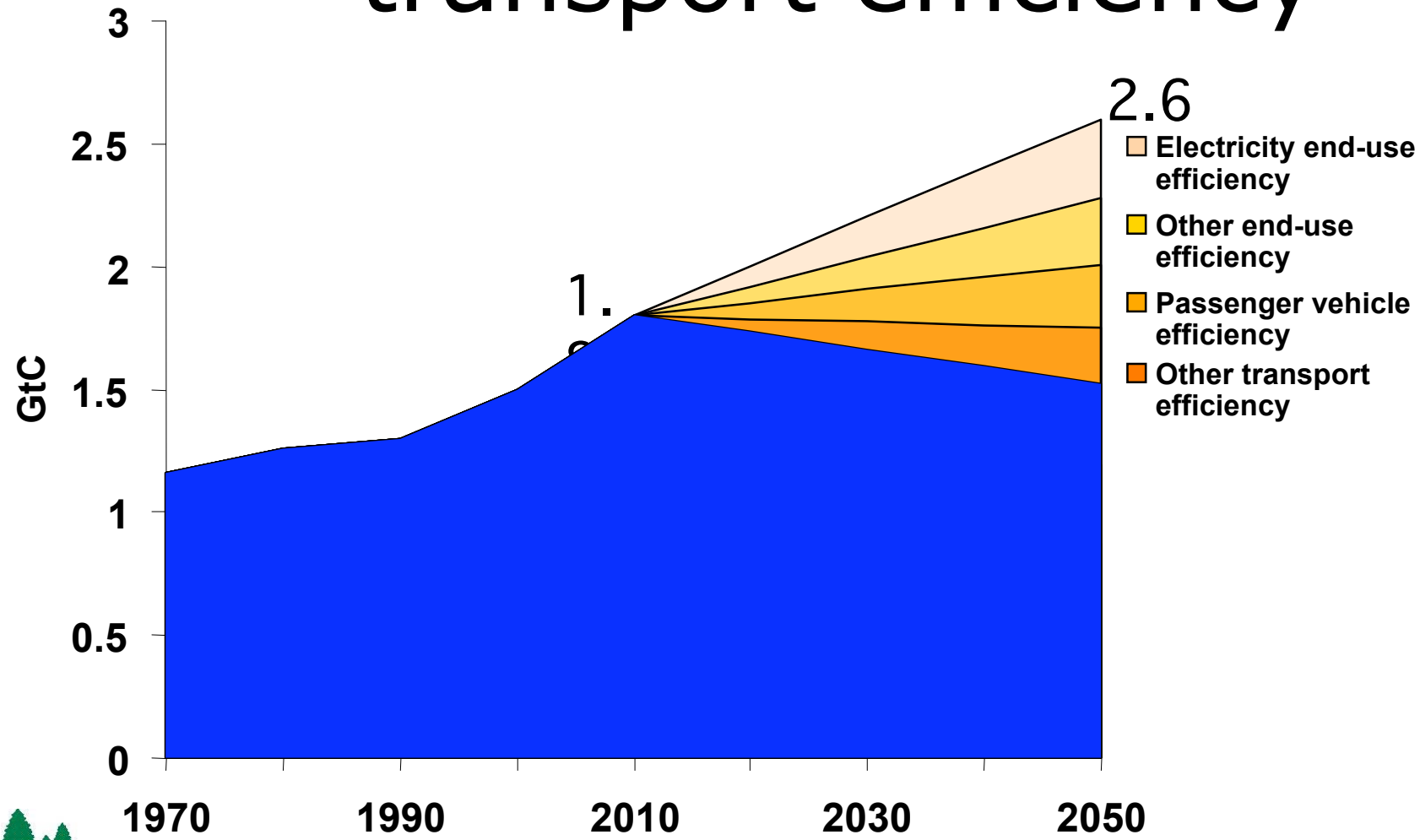
After Pacala and Socolow, 2004; ARI CarBen3

U.S. Emissions: Vehicle efficiency



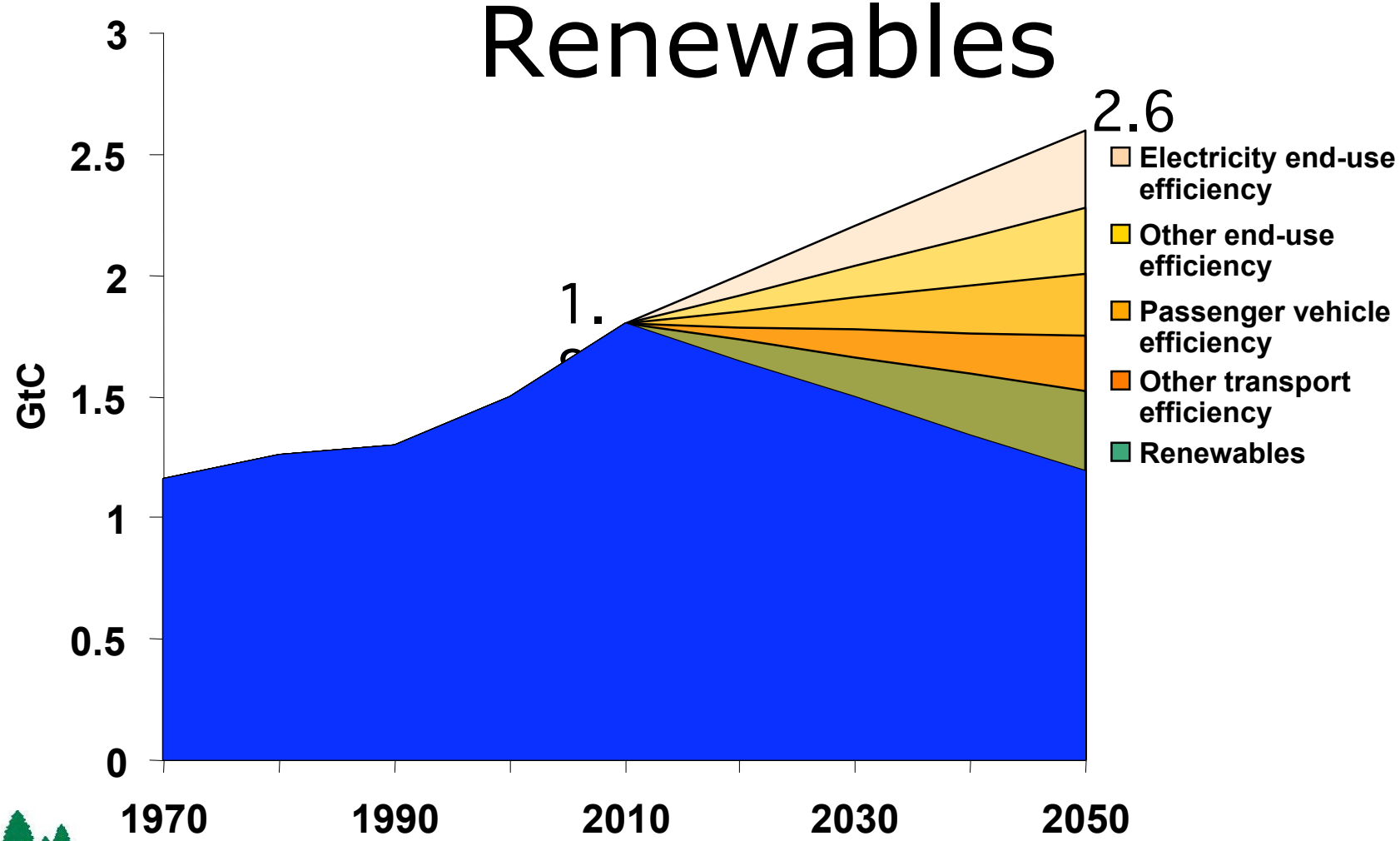
After Pacala and Socolow, 2004; ARI CarBen3

U.S. Emissions: Other transport efficiency



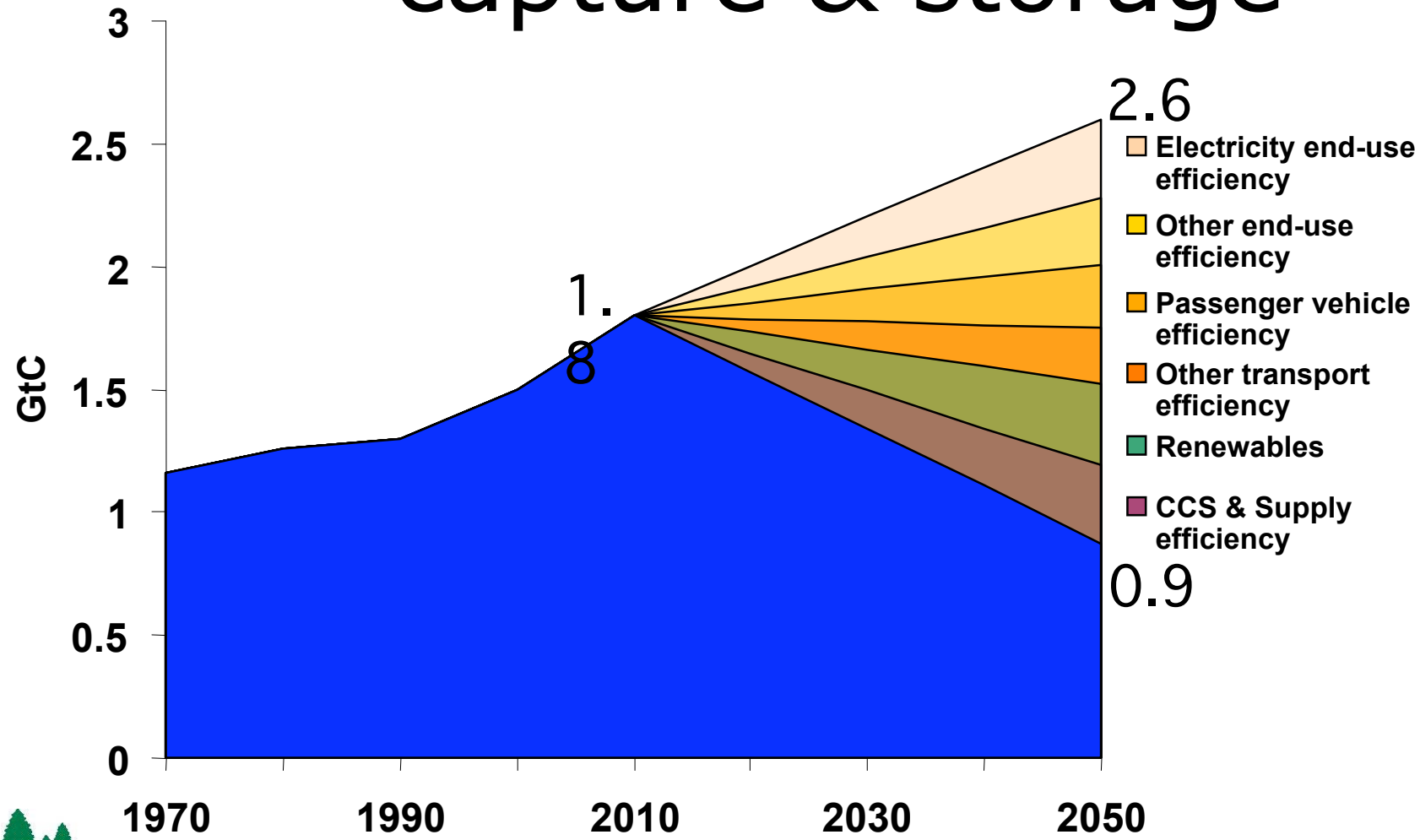
After Pacala and Socolow, 2004; ARI CarBen3

U.S. Emissions: Renewables



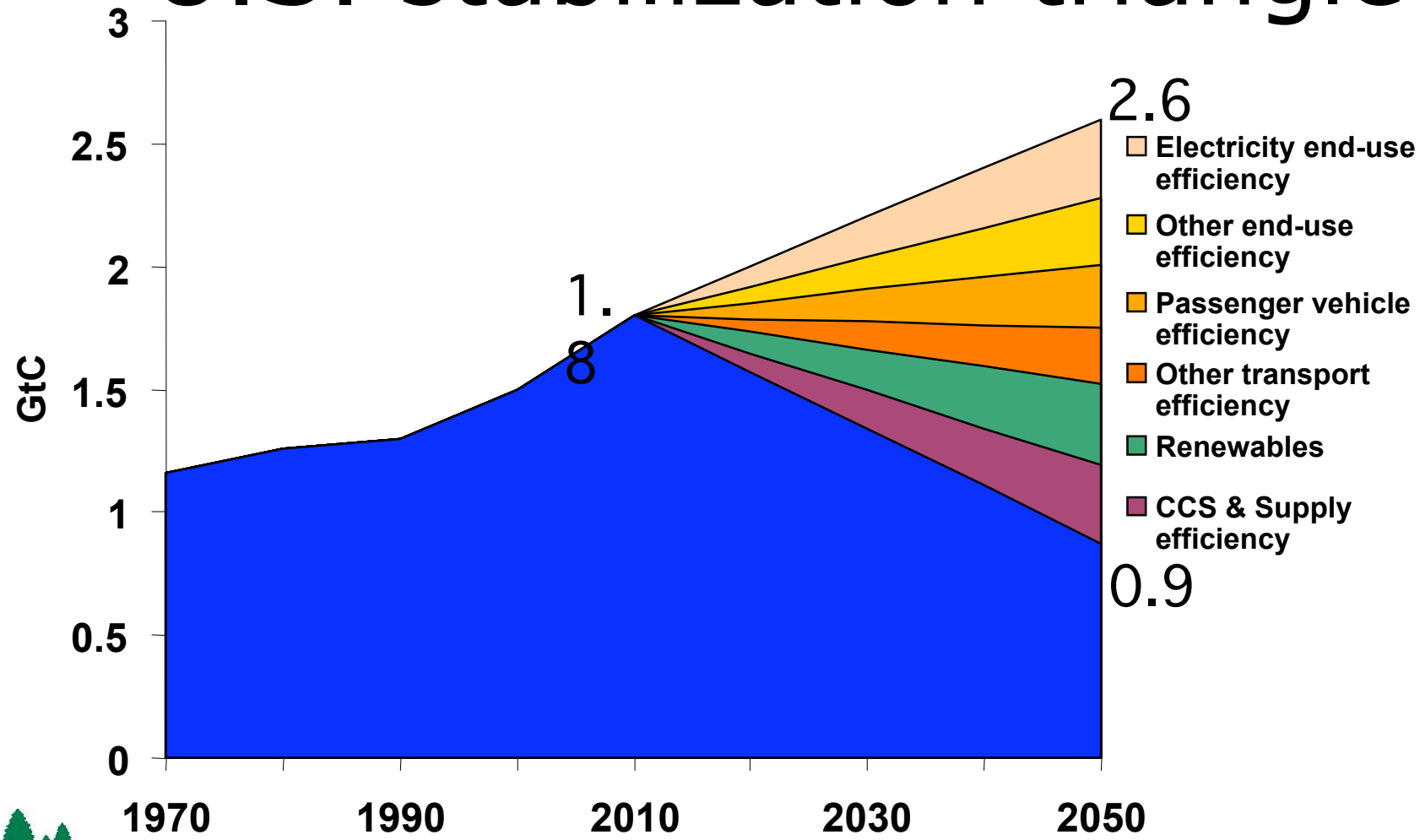
After Pacala and Socolow, 2004; ARI CarBen3

U.S. Emissions: Carbon capture & storage



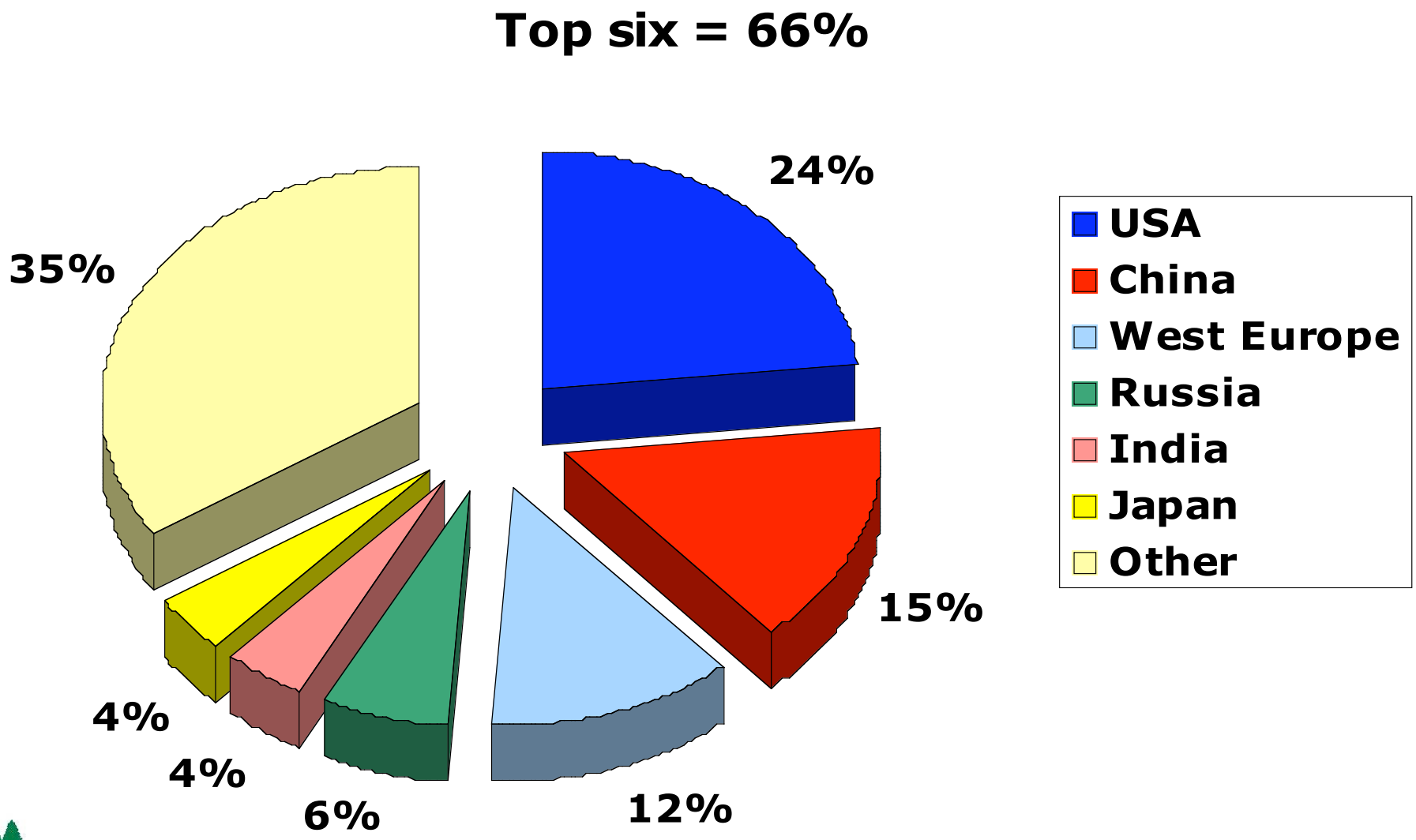
After Pacala and Socolow, 2004; ARI CarBen3

U.S. stabilization triangle



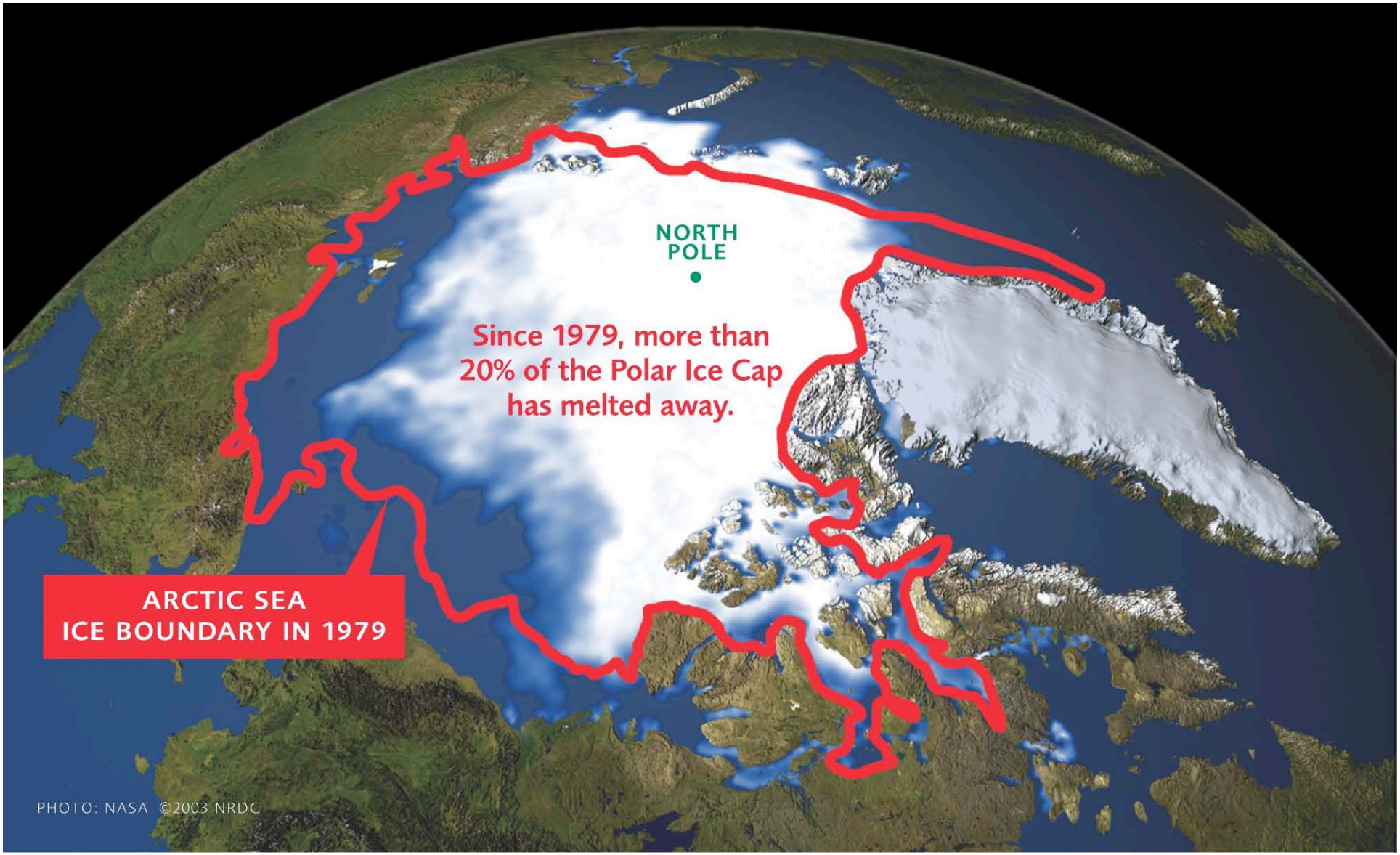
After Pacala and Socolow, 2004; ARI CarBen3

Biggest Emitters 2000-2025



Cumulative CO2 Emissions 2000-2025, EIA, *IEA 2002*

Warming Won't Wait. Will We?



Appendix

Details of IEA Alternative Policy Scenario

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Figure 11.4: Net Natural Gas Imports in Selected Regions in the Reference and Alternative Scenario, 2030

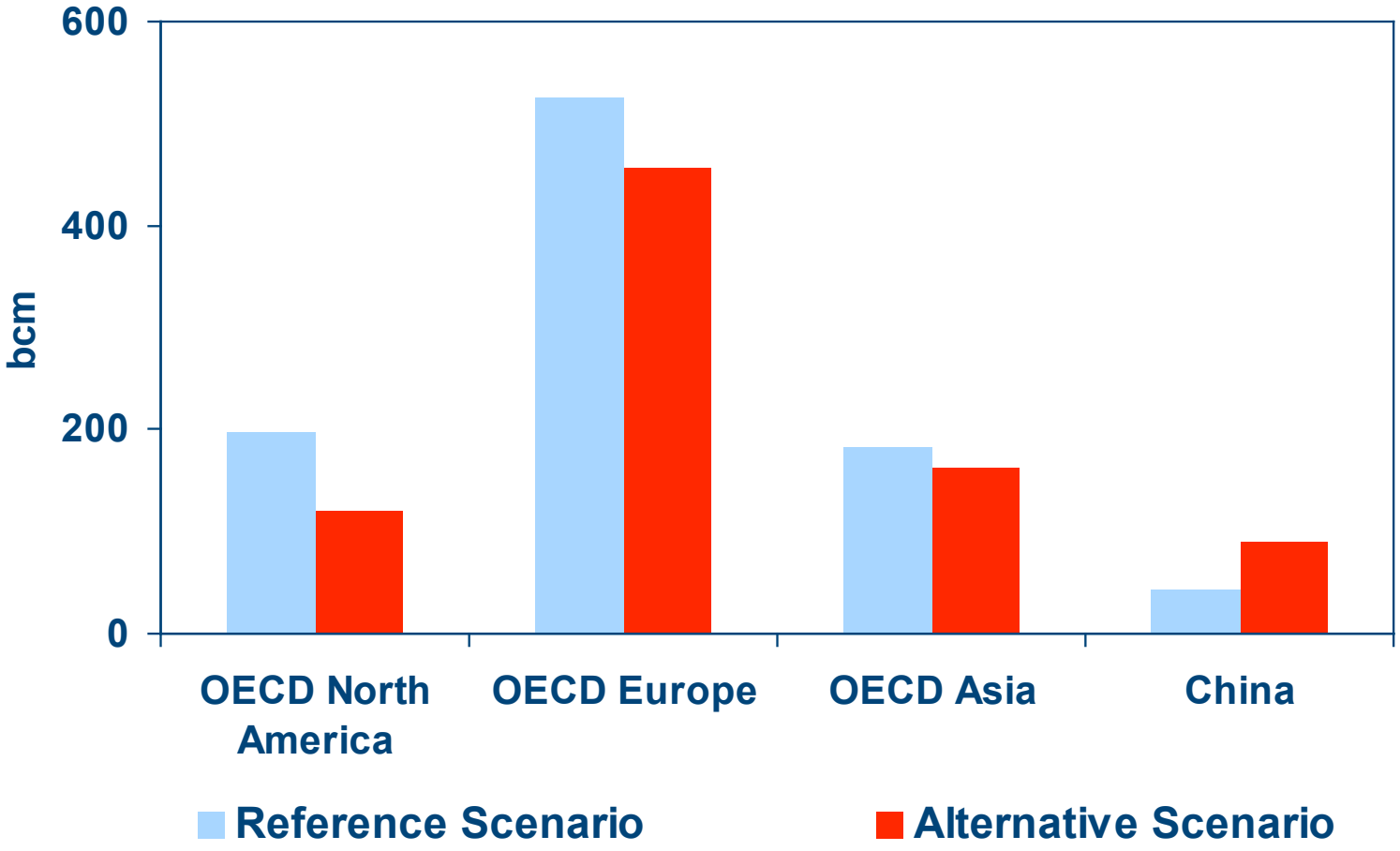

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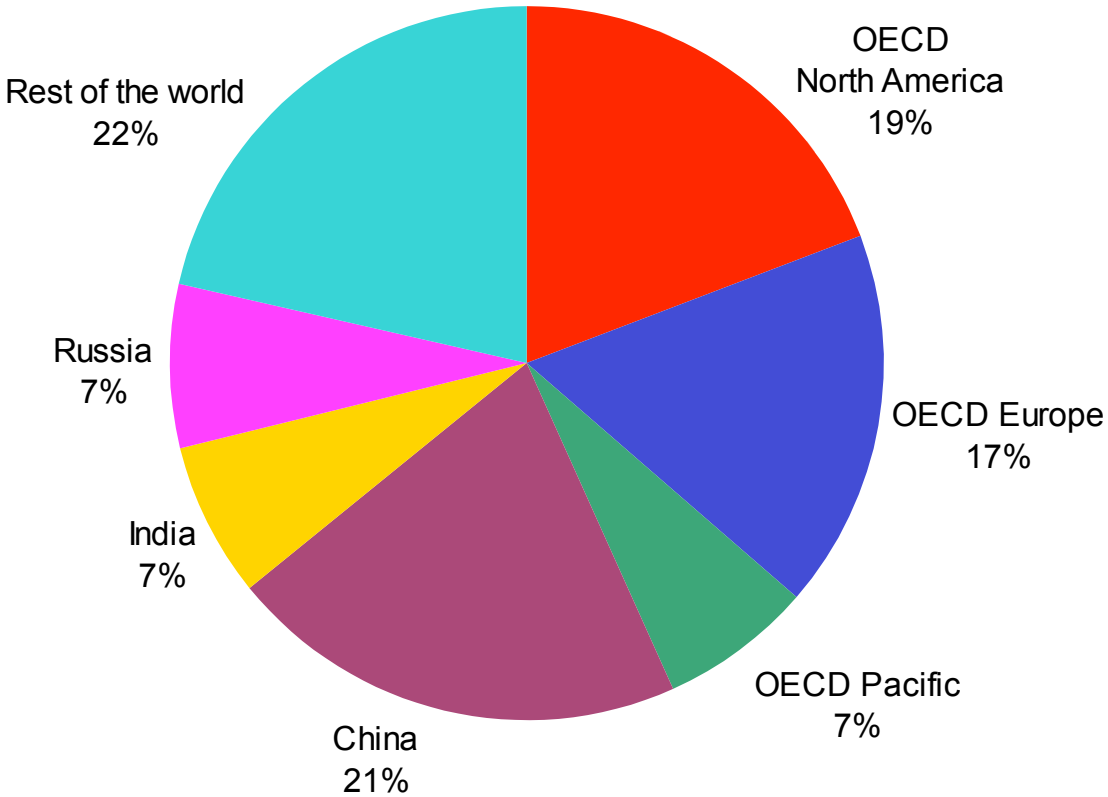
Figure 11.6: Cumulative Reduction Energy-Related CO_2 Emissions in the Alternative Scenario*, 2002-2030



* Compared with the Reference Scenario

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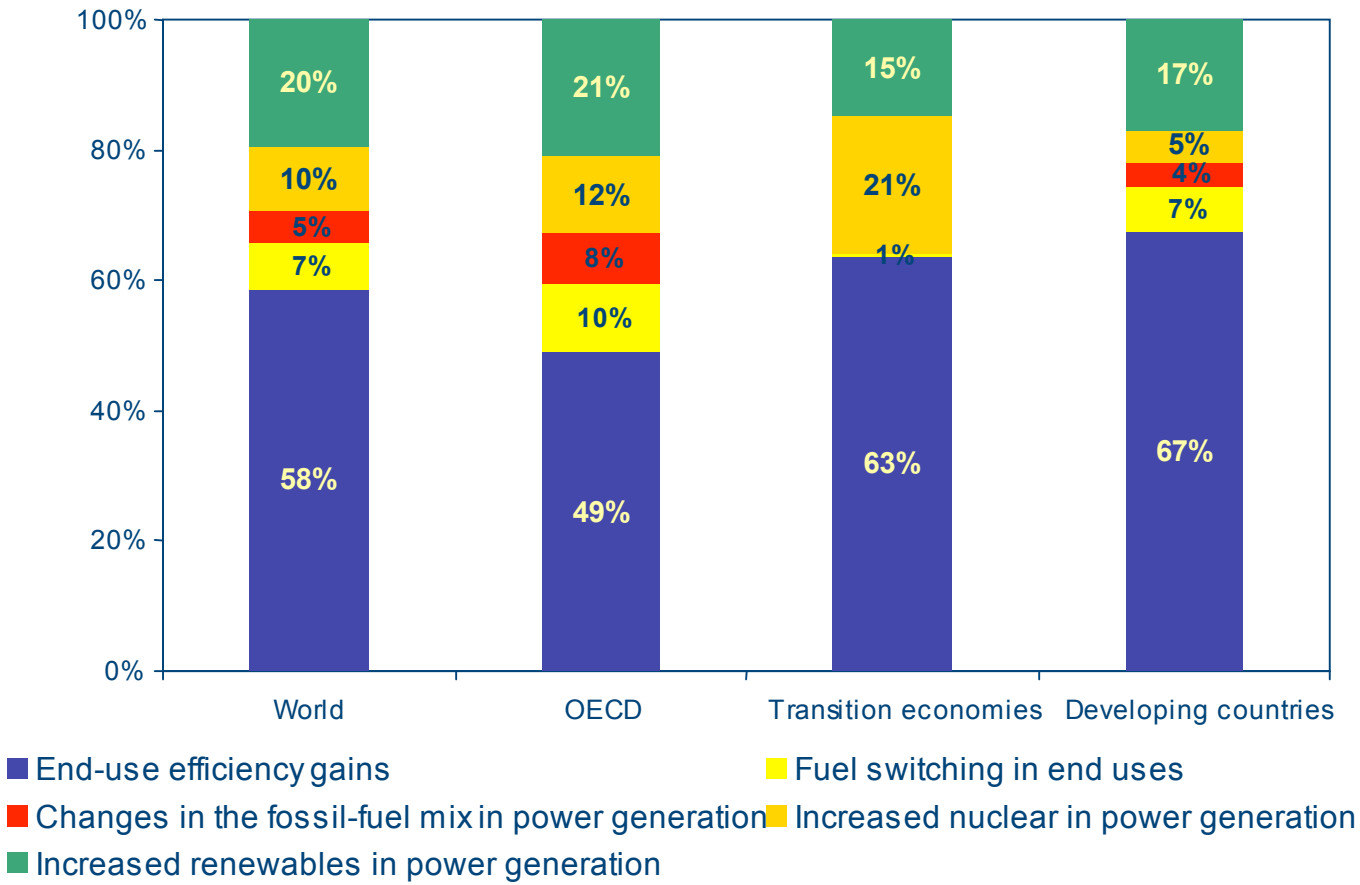
Figure 11.7: Reduction in Energy-Related in CO2 Emissions in the Alternative Scenario* by Contributory Factor, 2002-2030



* Compared with the Reference Scenario

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Figure 11.8: Difference in Cumulative Energy Investment between the Reference and Alternative Scenarios by Region, 2003-2030

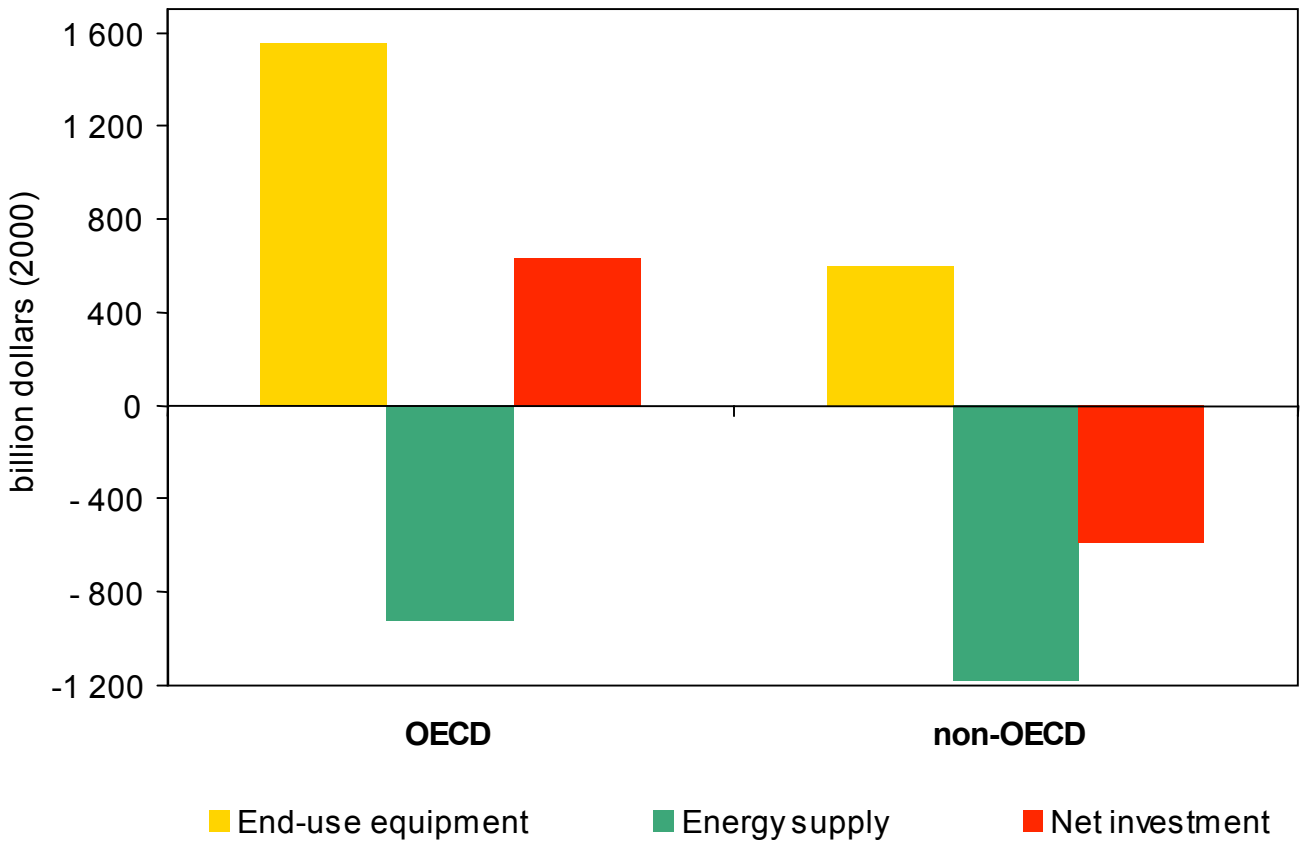

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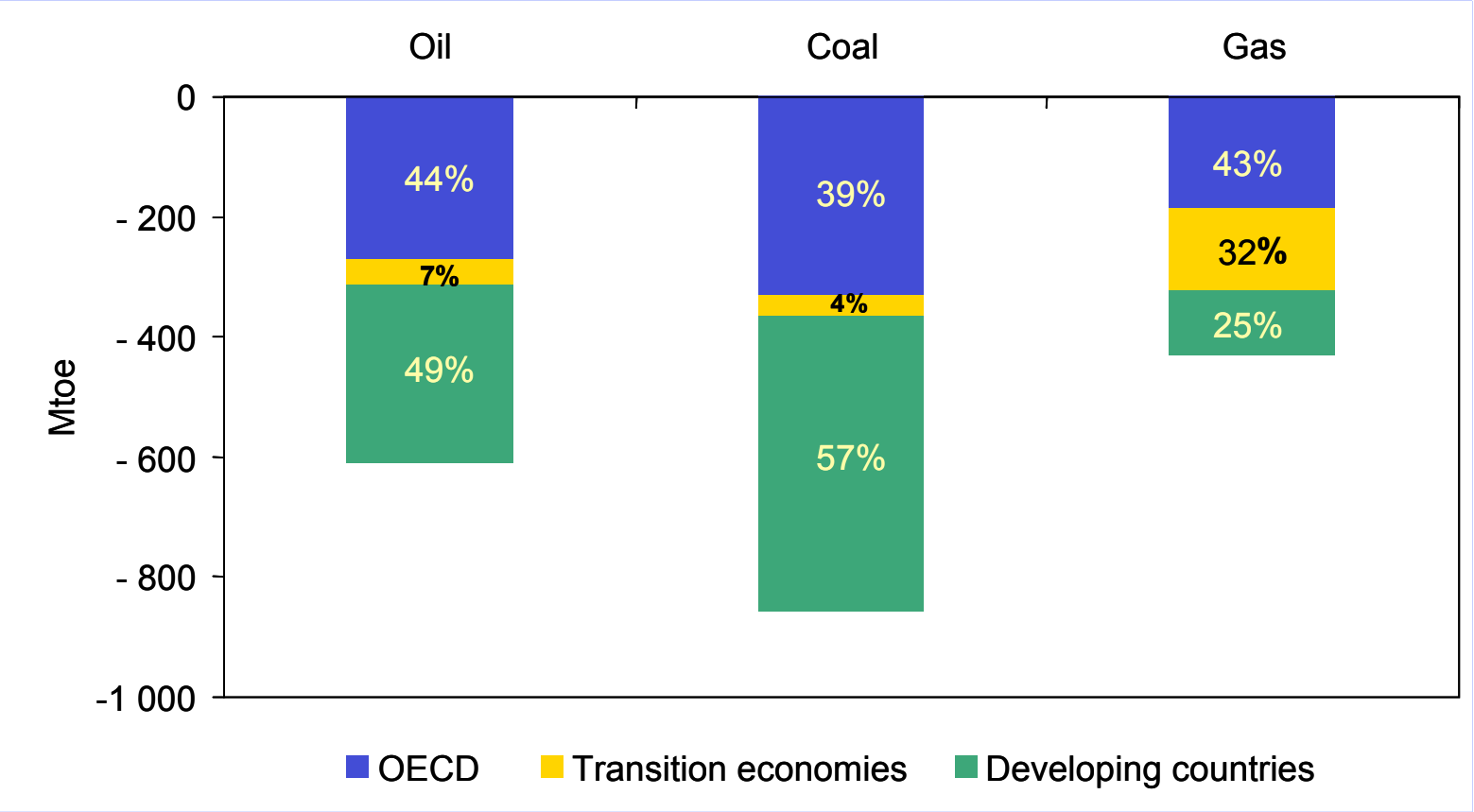
Figure 11.11: Reduction in Demand for Fossil Fuels in the Alternative Scenario* by Region, 2030



* Compared with the Reference Scenario

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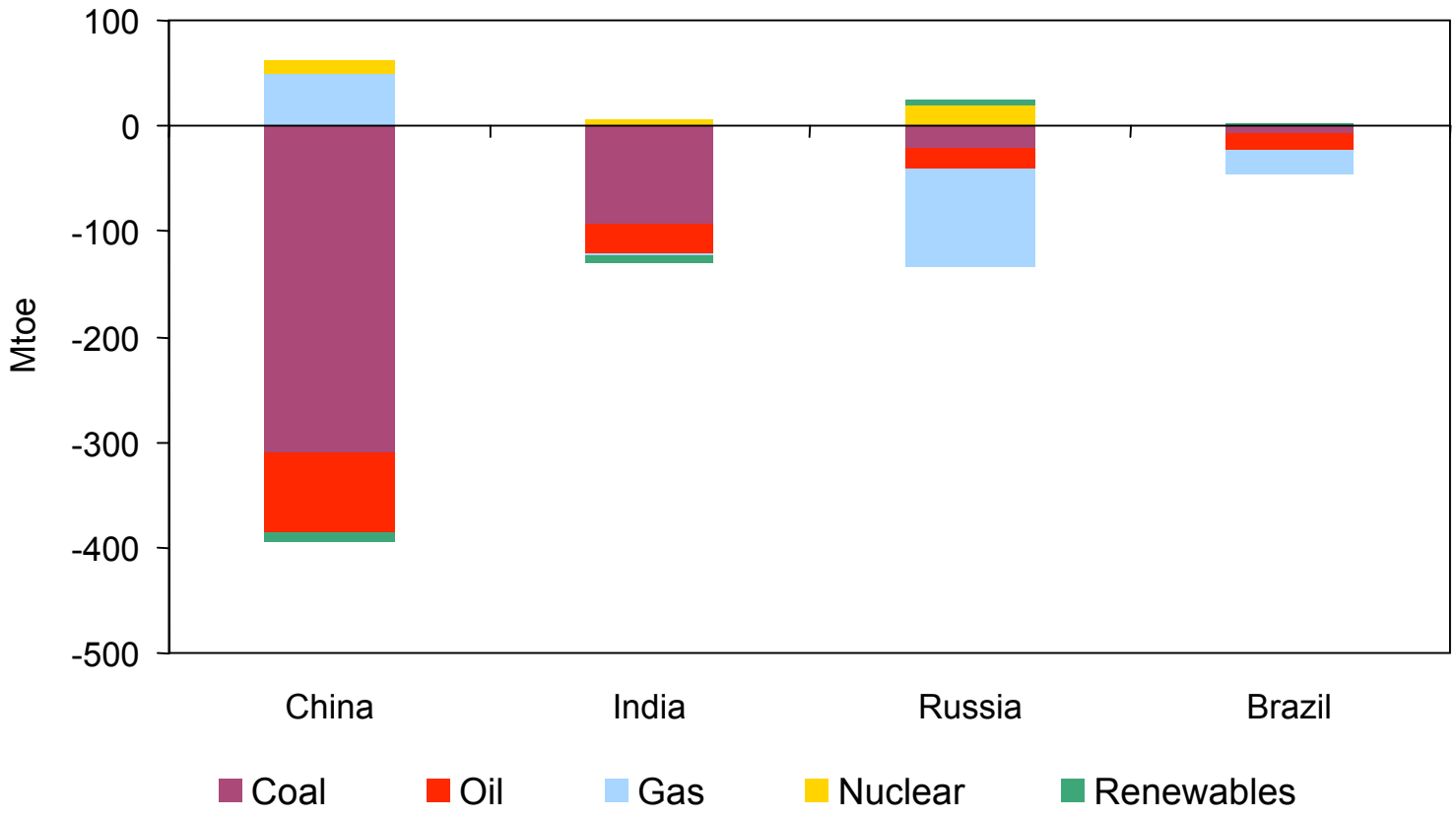
Figure 11.13: Change in Energy Demand in the Alternative Scenario in the Largest Non-OECD Countries*, 2030



* Compared with the Reference Scenario

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Figure 11.18: Oil Demand for Transport in the Reference and Alternative Scenarios by Region

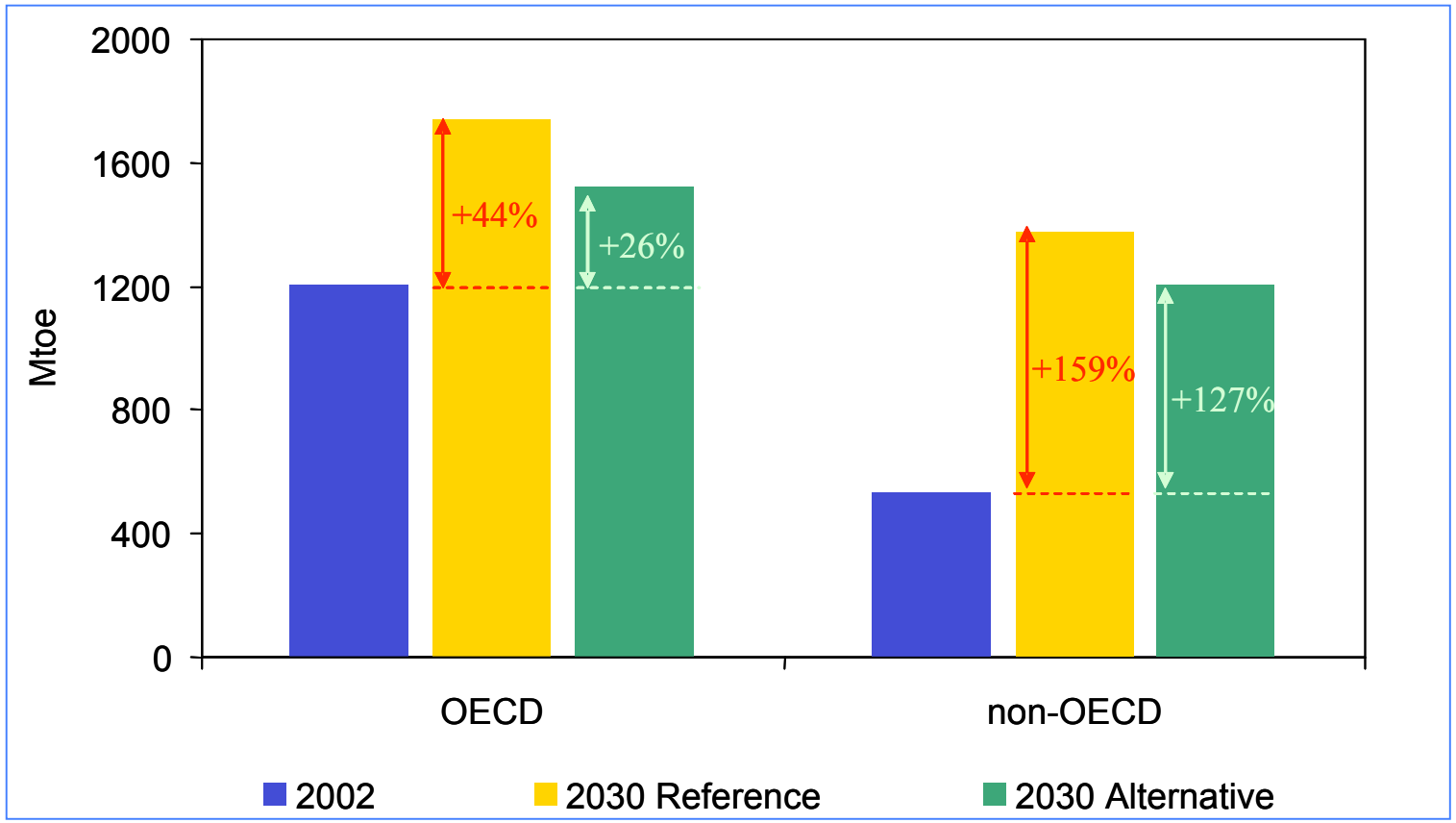

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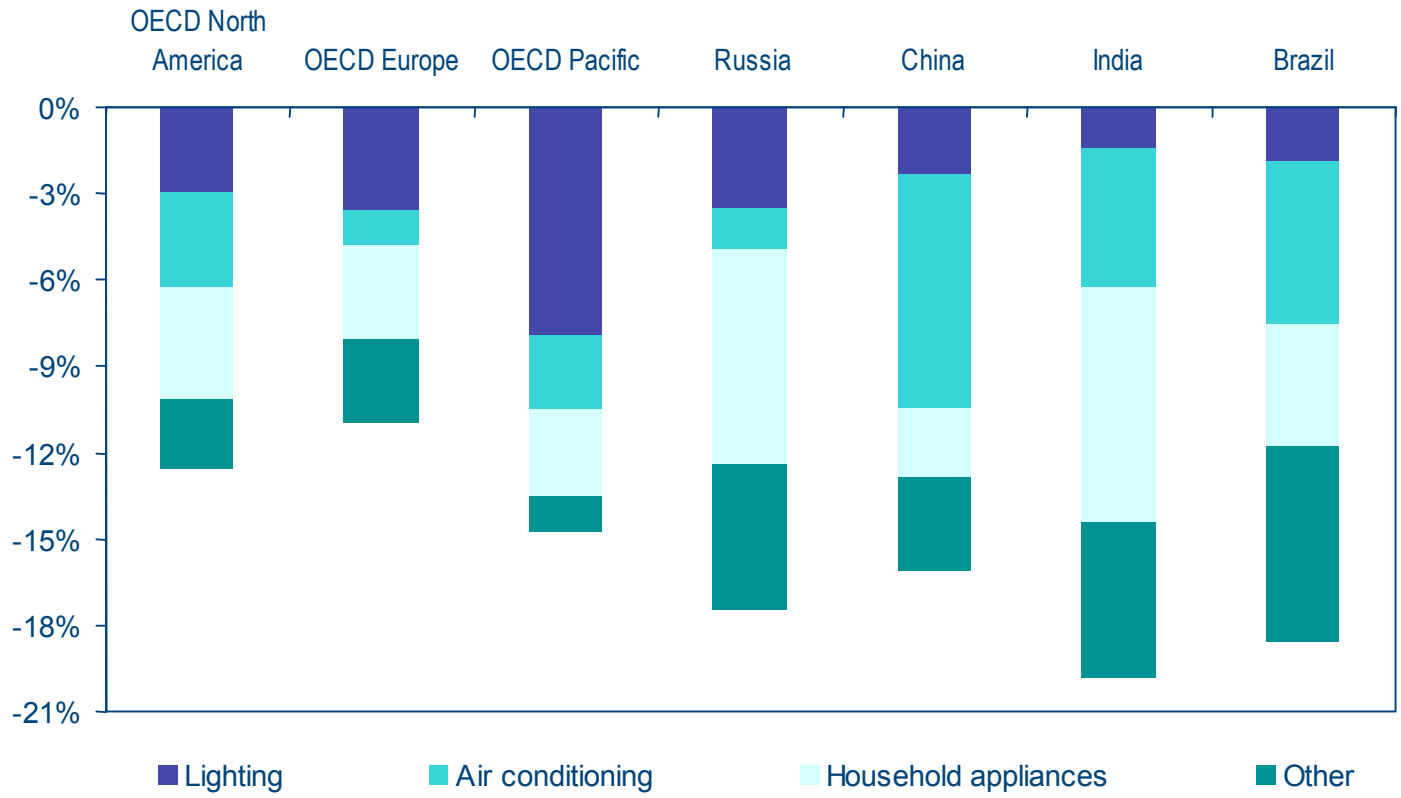
Figure 11.20: Reduction in Electricity Demand in the Residential and Services Sectors in the Alternative Scenario*, 2030



* Compared with the Reference Scenario

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