Global Energy Assessment

General Overview

IIASA

International Institute for Applied Systems Analysis, and its Partners

Thomas B Johansson
Co-Chair, Executive Committee

Need for an Energy Assessment

- The world is at a critical juncture for energy policy – new challenges have emerged, while old challenges remain

- Previous studies do not identify the strategies and solutions needed to ***comprehensively address*** today's major energy and energy-related challenges in an ***integrated*** way

GEA Objectives include:

- Scientifically based, comprehensive, integrated, and policy-relevant analysis of issues and options related to
  - Energy and sustainability challenges
  - Resource and technology options, demand and supply
  - System issues, scenarios
  - Policy options
- Local, Regional, and Global dimensions
- Provide basis for policy formulation

Challenges requiring actions on Energy

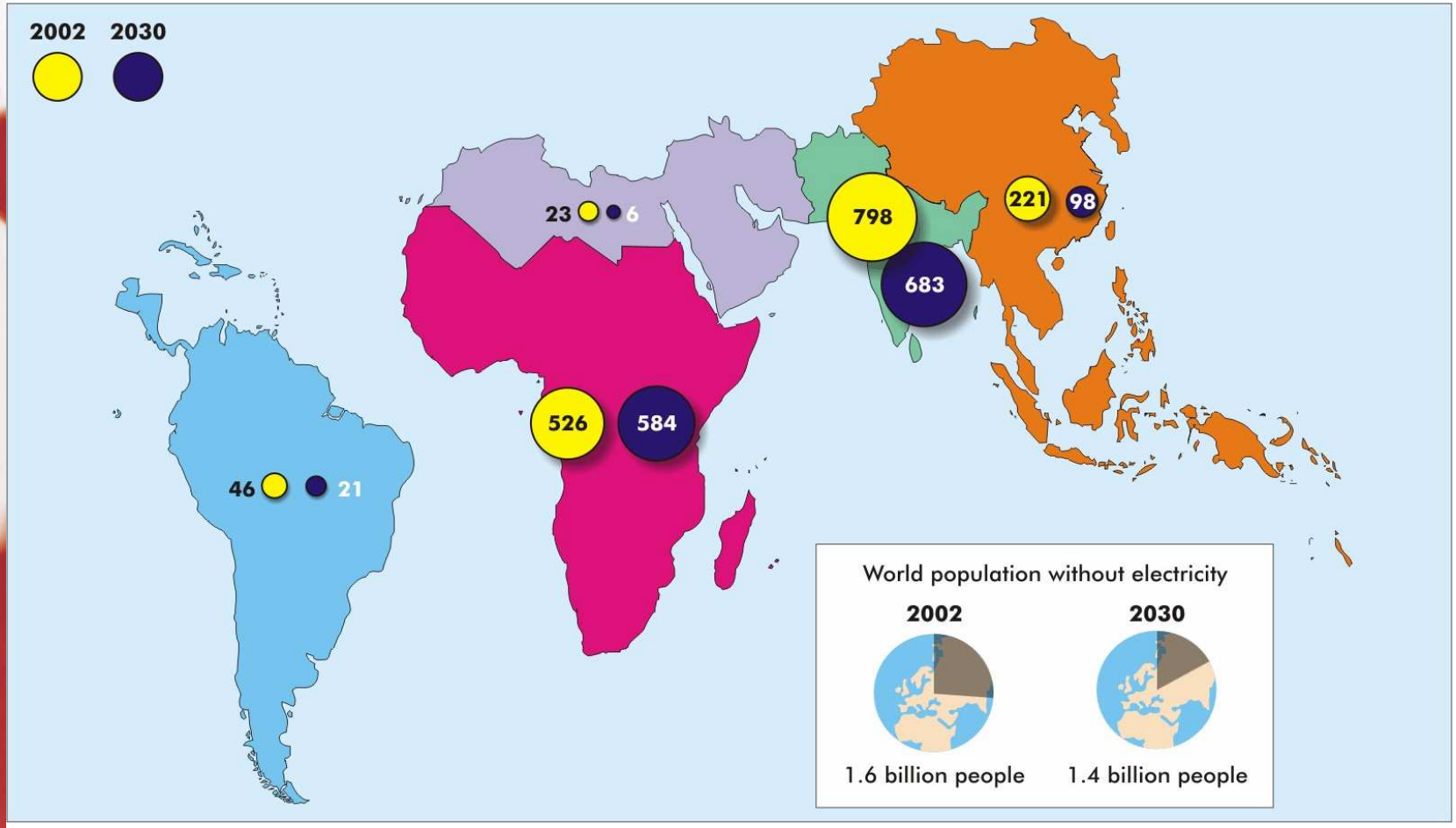
a. **equity** in energy services
b. **affordable** energy services
c. **secure** supplies
d. **local and regional environmental challenges**
e. **climate change mitigation**
f. **ancillary risks**

Major Energy System Changes Needed!

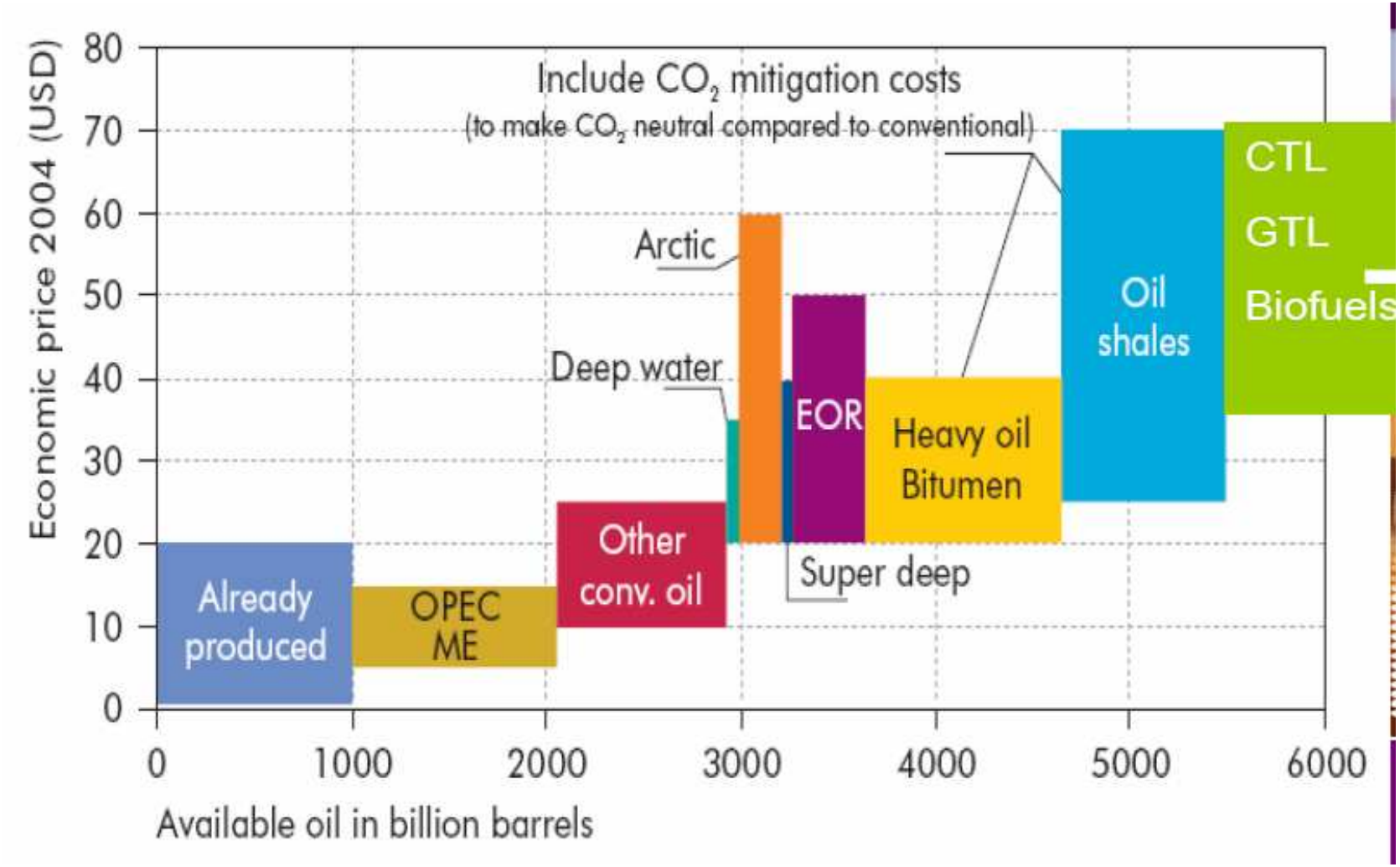
INTERNATIONAL ENERGY AGENCY

WORLD ENERGY OUTLOOK 2004

Electricity Deprivation



In 2030, if no new policies are implemented, there will still be 1.4 billion people without electricity



Will sufficient supply chain investments flow? Climate concerns aggravated?

Source: IEA 2005, Resources to Reserves – Oil & Gas Technologies for the Energy Markets of the Future

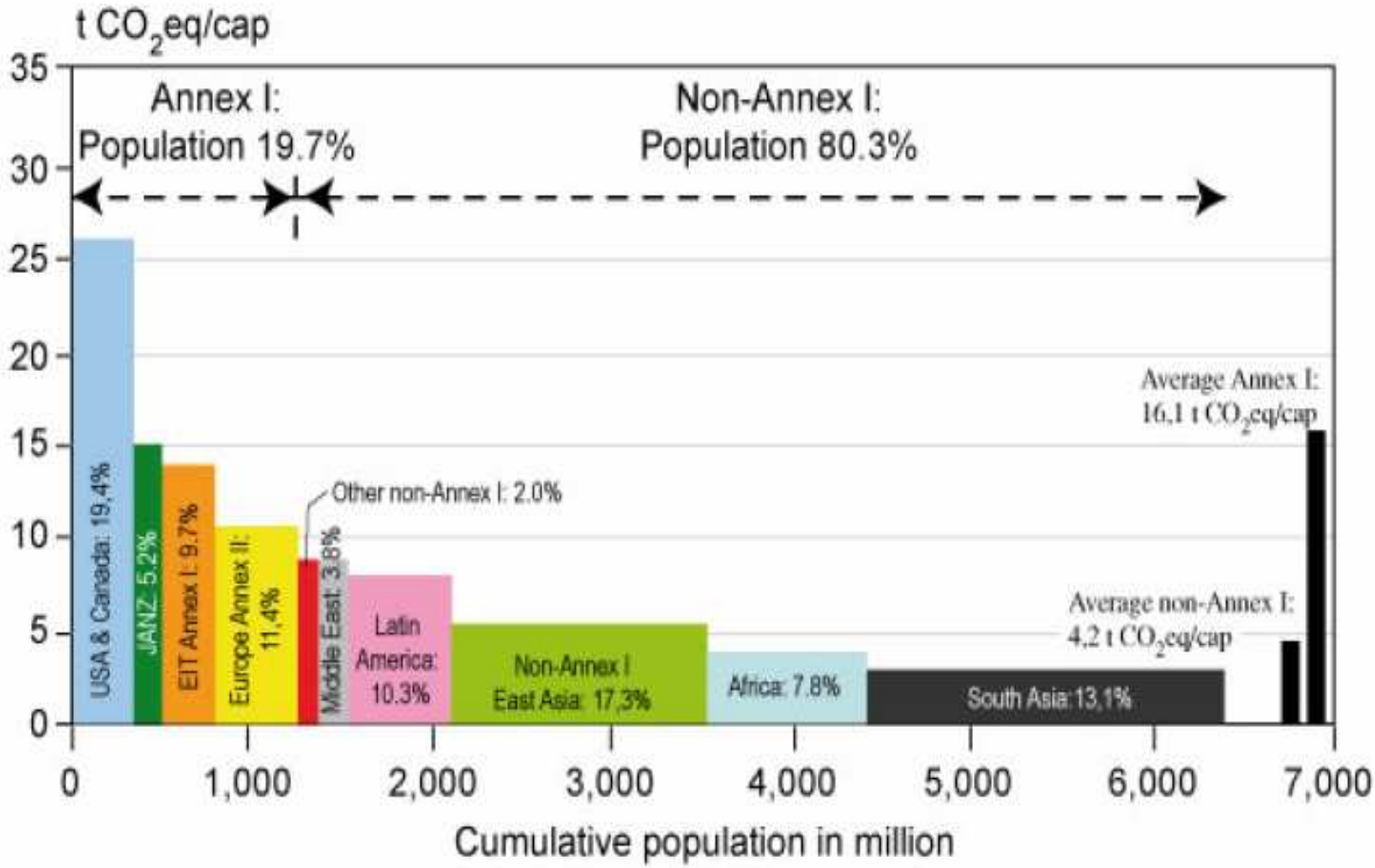
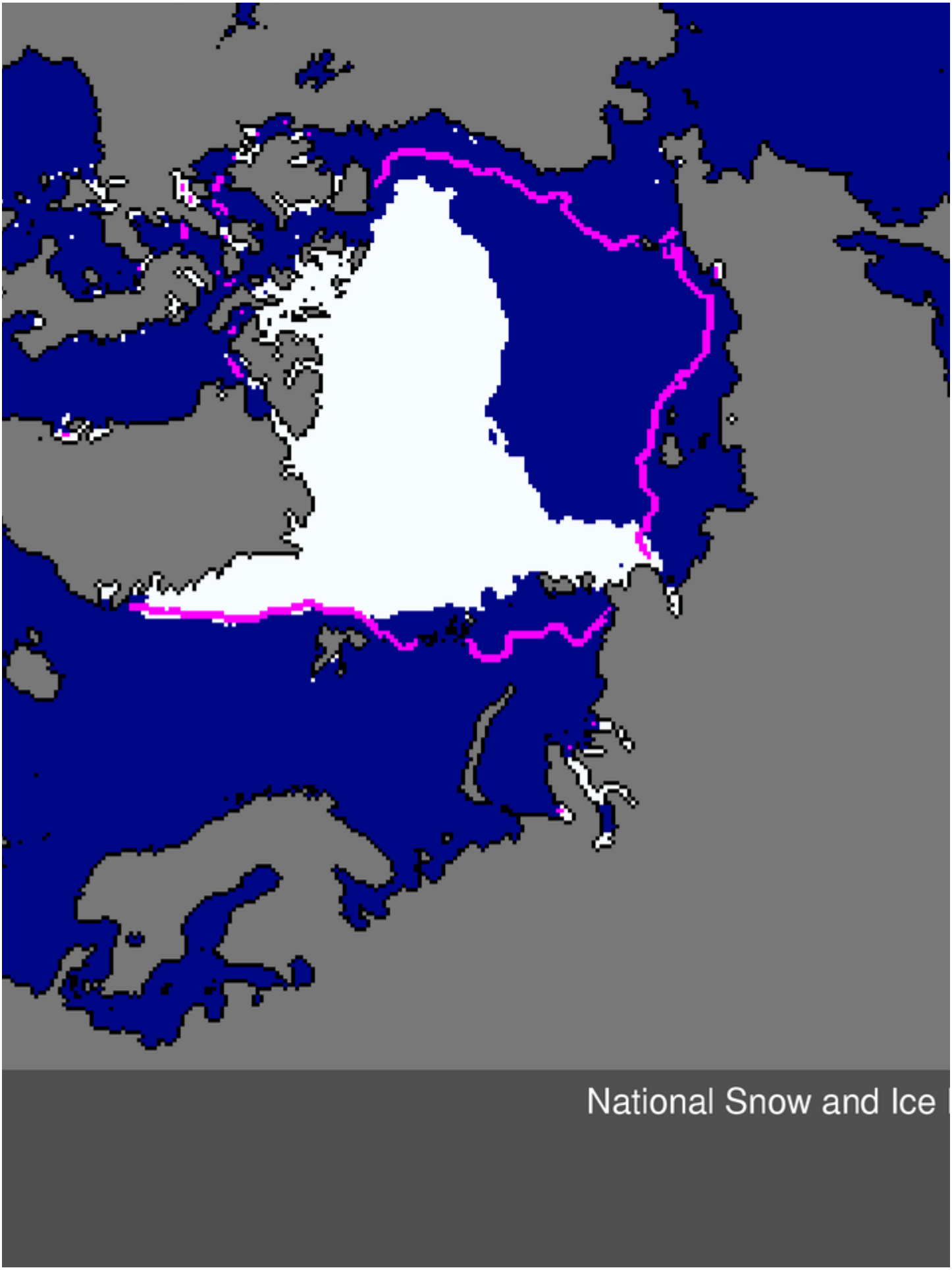
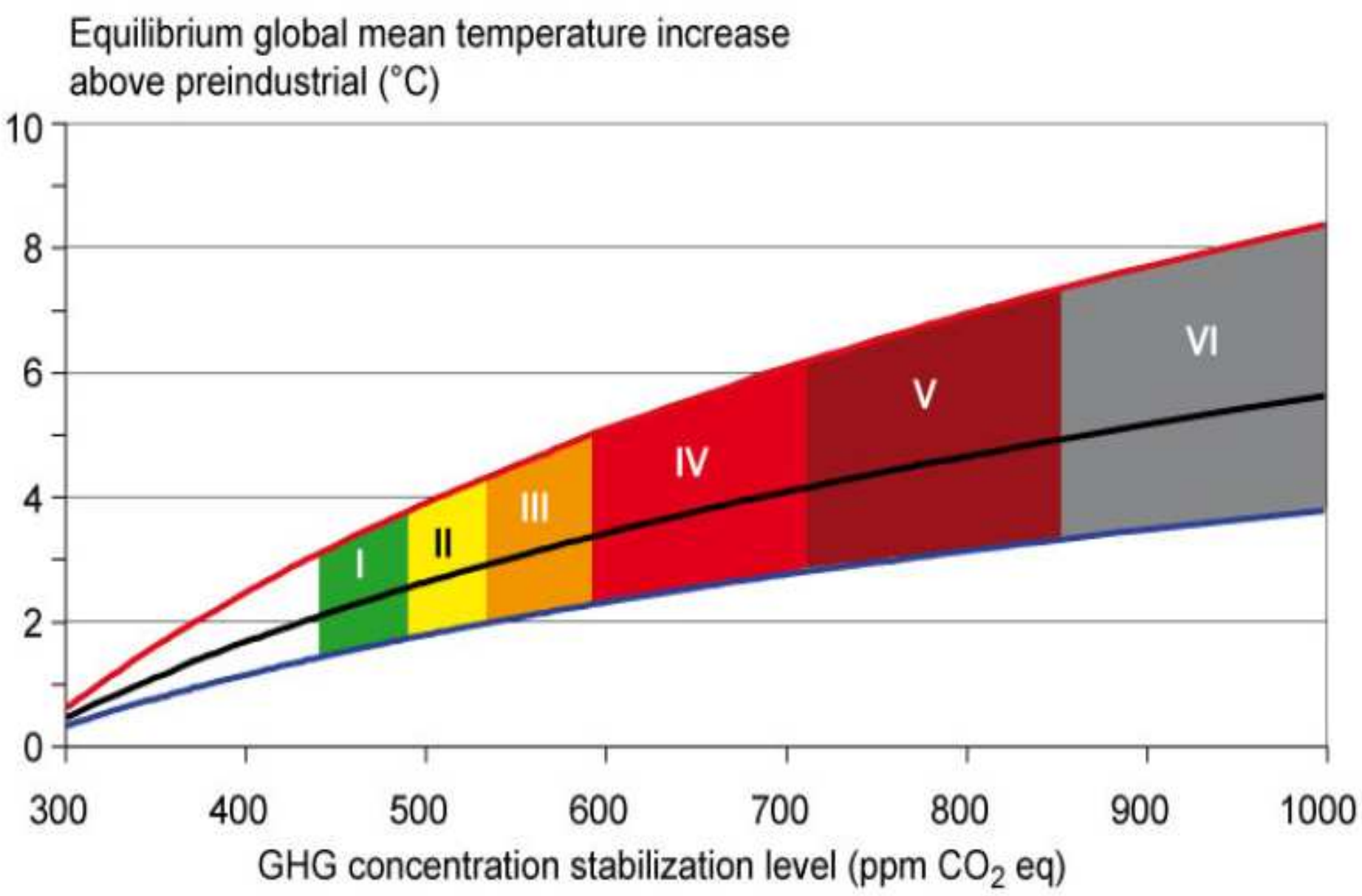
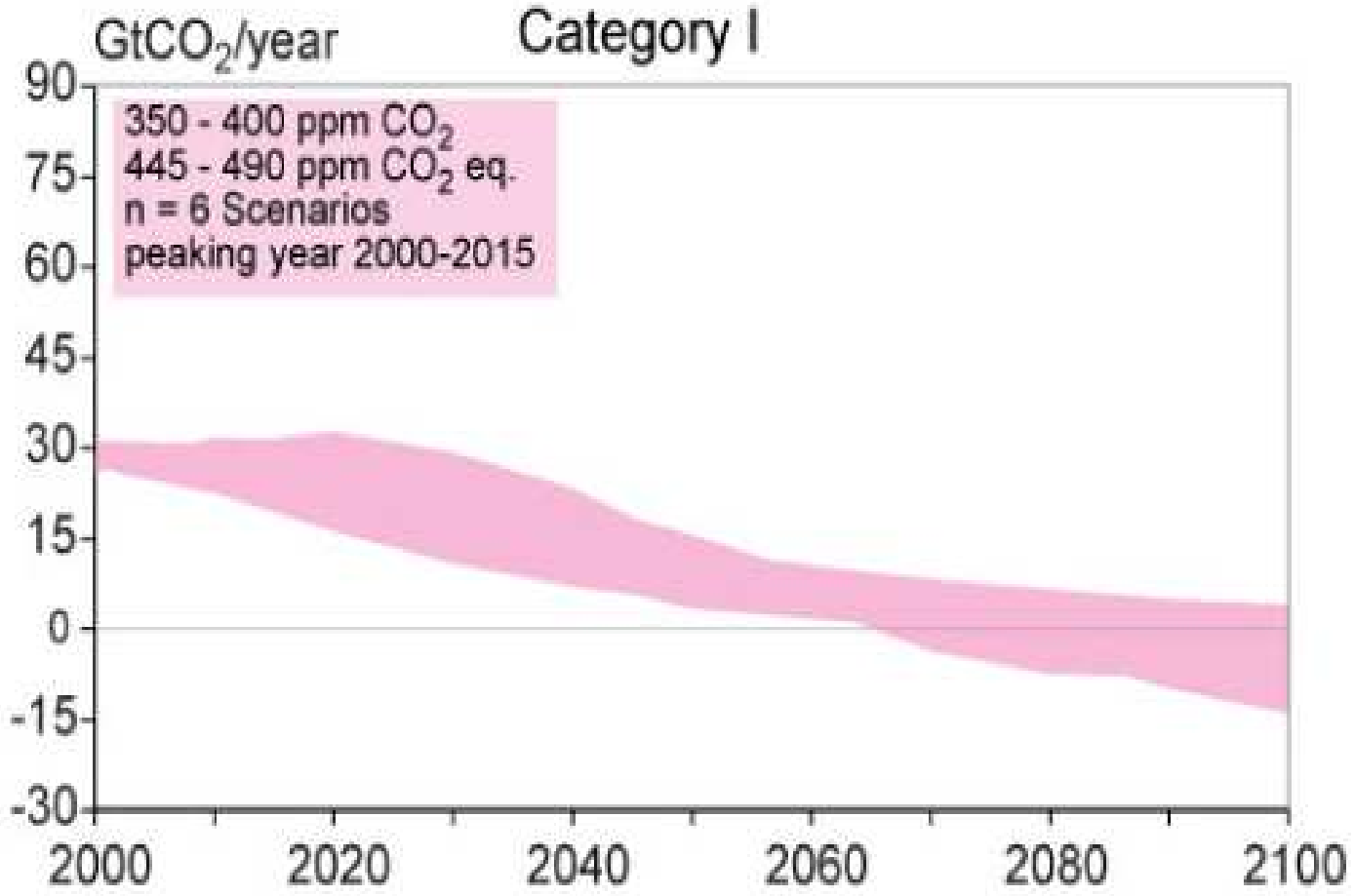


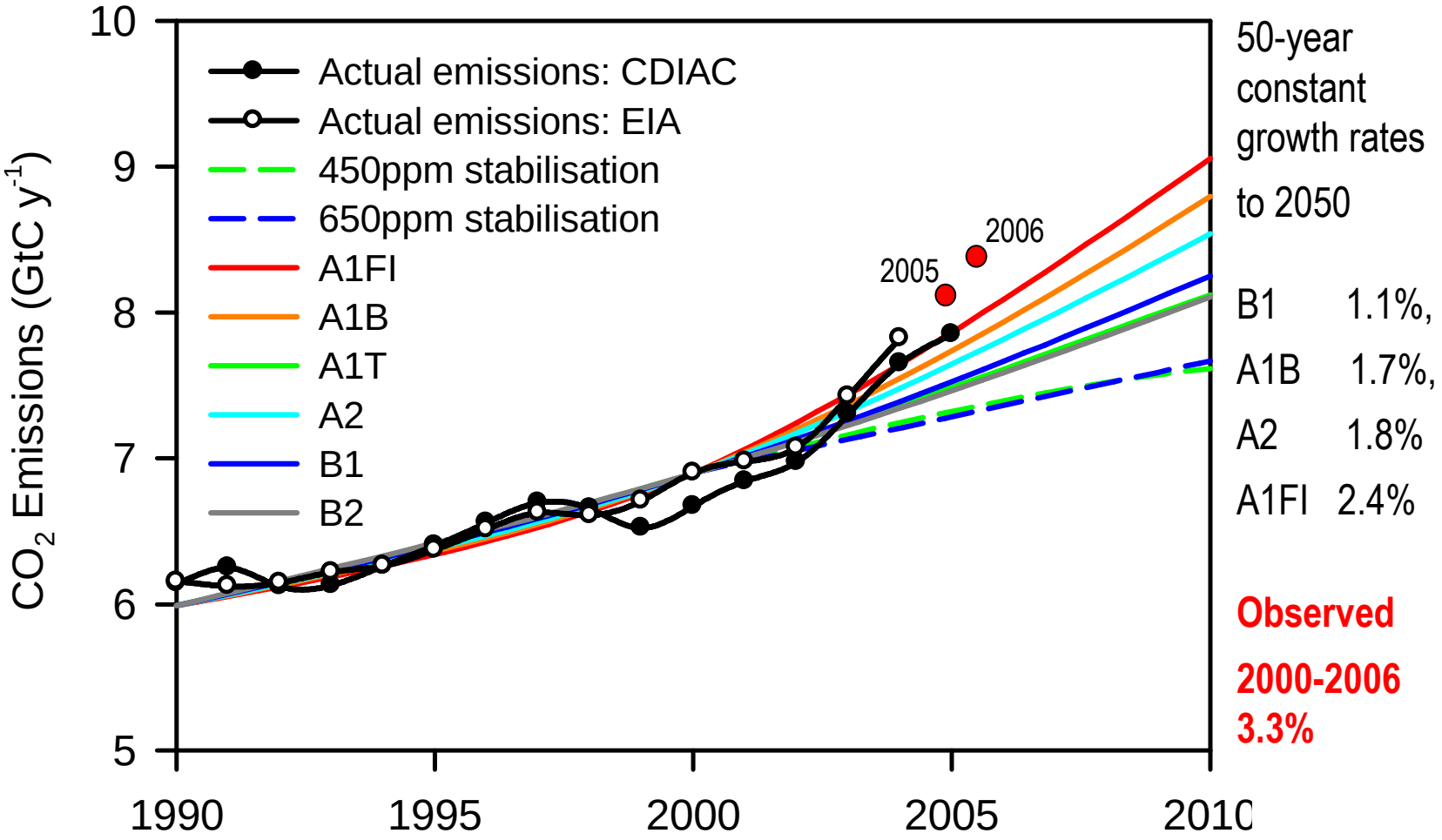
Figure TS.4a: *Distribution of regional per capita GHG emissions Kyoto gases gases including those from land-use) over the populat of different country groupings in 2004. The percentages in the bars indicate a region's share in global GHG emissions [Figure 1.4a]*


National Snow and Ice


Equilibrium global mean temperature increase above preindustrial (°C)
10
8
6
4
2
0
I
II
III
IV
V
VI
300
400
500
600
700
800
900
1000
GHG concentration stabilization level (ppm CO_2 eq)


GtCO2/year
Category I
350 - 400 ppm CO2
445 - 490 ppm CO2 eq.
n = 6 Scenarios
peaking year 2000-2015
90
75
60
45
30
15
0
-15
-30
2000
2020
2040
2060
2080
2100

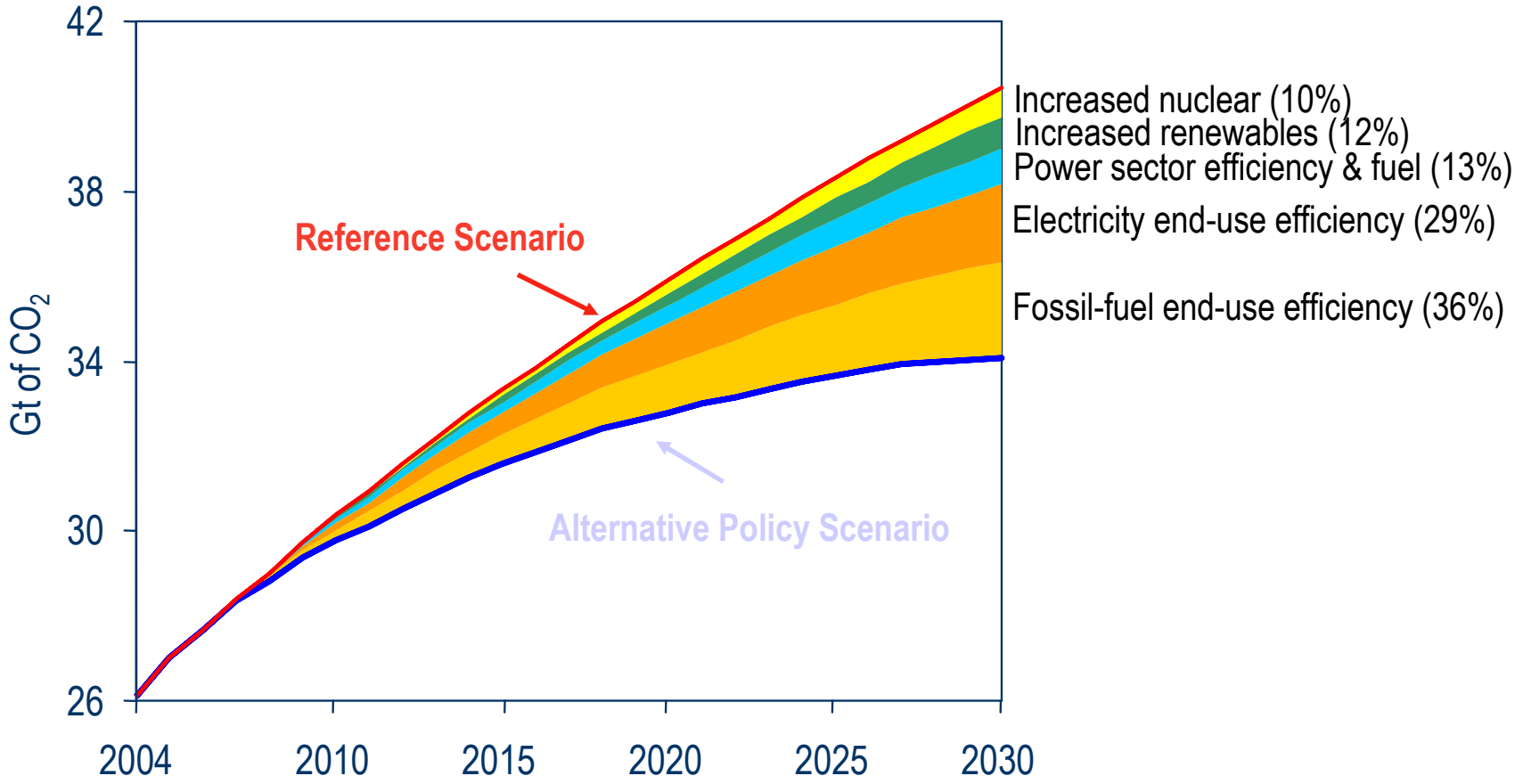
Trajectory of Global Fossil Fuel Emissions



Raupach et al. 2007, PNAS

Alternative Policy Scenario:

Global Savings in Energy-Related CO_2 Emissions



Global Energy Challenges translate into need for

- Access to modern forms of energy (a prerequisite for reaching MDGs)
- Growing demand for energy services
- Security and reliability of systems
- Deep CO_2 and GHG reductions
- Investment in R&DD and diffusion

These **challenges** must be addressed

simultaneously

adequately

timely

Energy Options for a more Sustainable Future

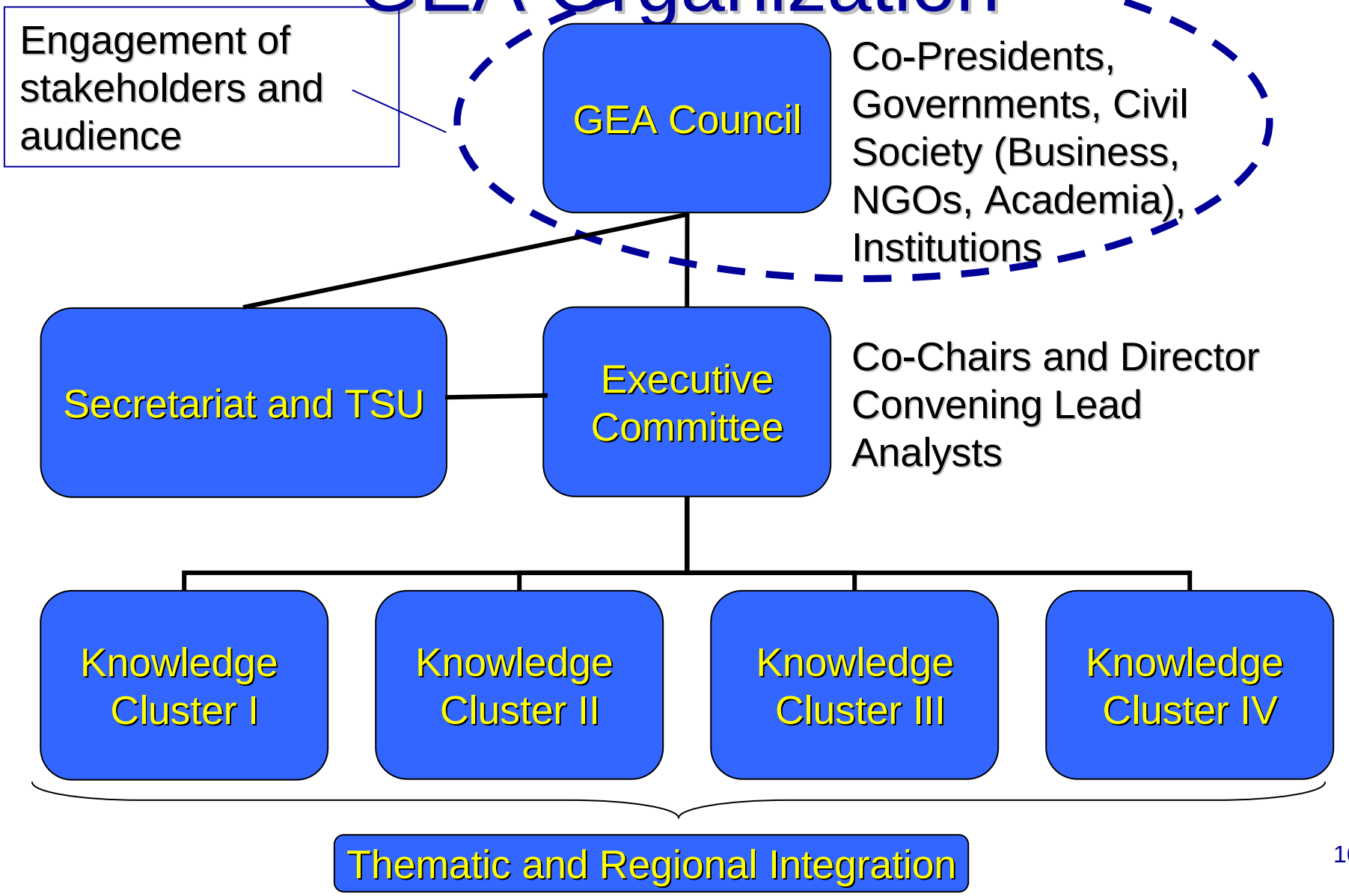
- **Improved Energy Efficiency** - especially at the point of end-use in buildings, electric appliances, vehicles, and production processes.

- **More Renewable Energy**: such as biomass, wind, solar, hydro, and geothermal

- **Advanced Energy Technologies**: next generation of fossil fuel technologies, esp. CCS

- **Nuclear technologies:** Safety? Waste? Cost? Proliferation? Terrorism?

GEA Organization



GEA Knowledge Clusters

- **Cluster I: Major Global Issues and Energy**
  - assessment of the **Challenges**
- **Cluster II: Energy Resources and Technological Options**
  - assessment of the **Components** available to build future energy systems
- **Cluster III: Possible Sustainable Futures**
  - assessment of how to combine the Components to create **Systems** that address the Challenges
- **Cluster IV: Policies Advancing Energy for Sustainable Development**
  - assessment of the **Policies** needed to address the Challenges and realize the Systems

GEA Main Outputs

- Major Report in 4 Clusters (Parts)
- Issues papers
- Information for intergovernmental processes, governments, corporations, academic sector, education, NGOs, …
- Broad regional and national consultations
- Broad outreach efforts, many media channels

Supporting Organizations

- Austria
- Brazil
- Sweden
- UNDP
- UNEP
- UNIDO
- World Bank
- IIASA
- WEC
- IEA
- WBSD
- UN Foundation
- Petrobras
- TEPCO
- ...
- ...

Global Energy Assessment

- **unique** and **timely**
- **comprehensive** and **integrated**
- **process** going beyond a **report**
- **policy** relevant and **capacity** enhancing
- **options** and **strategies** for the way forward

IIASA

International Institute for Applied Systems Analysis

www.GlobalEnergyAssessment.org

How will GEA be different?

- The only **comprehensive** and **integrated** assessment of energy issues within constraints. Regional and global scenarios!
- The only study to combine a **technical** assessment with **strategic** policy and investment **analysis** for global and place-specific actions
- The only study providing timely analysis for addressing **recent and emerging** global **challenges**; and able to synthesize recent studies on energy

Global Energy Assessment
Towards a more Sustainable Future

- The *magnitude* of the change required is *huge*
- The challenge is to find a way forward that addresses all the issues *simultaneously*
- A paradigm shift is needed: energy end-use efficiency, new renewables, advanced nuclear and carbon capture and storage.

there are limits on each option, e.g.

- Conventional oil and gas production?
- Abundant but carbon rich heavy fossil fuels?
- Environmentally sound bioenergy/biofuels?
- Wind and hydro resources often far from demand centres?
- Hydrogen infrastructure and rate of introduction?
- Demand side challenges? Efficiency? Achievable?