

Knowledge Based Bio-Economy

Setting the Perspective

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Study prepared and coordinated by



Experts involved in the study

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Population
+50% by 2050



Food
+70% by 2050

+

Energy
+100% by 2050

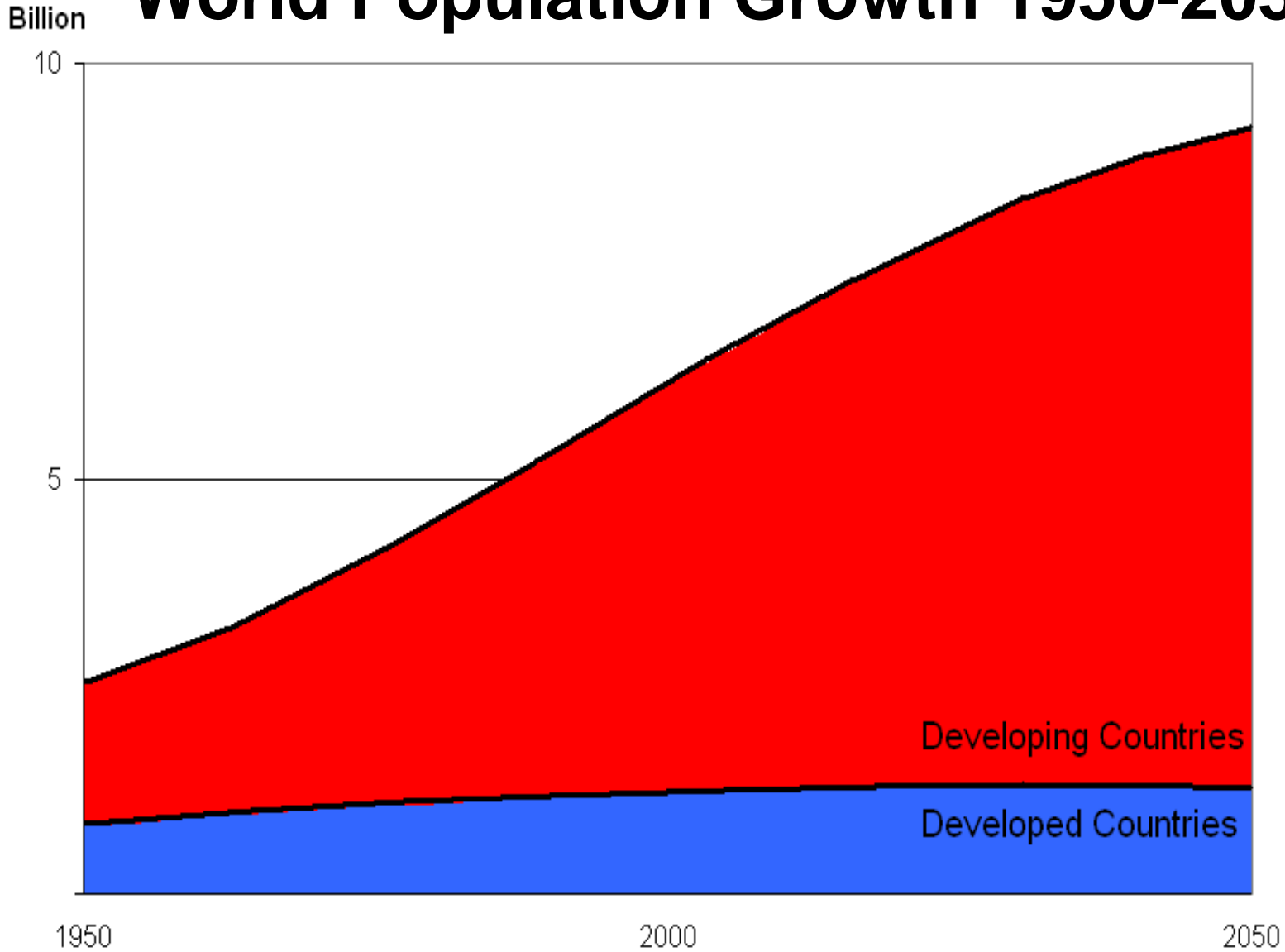
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Climate
+2° by 2050

-



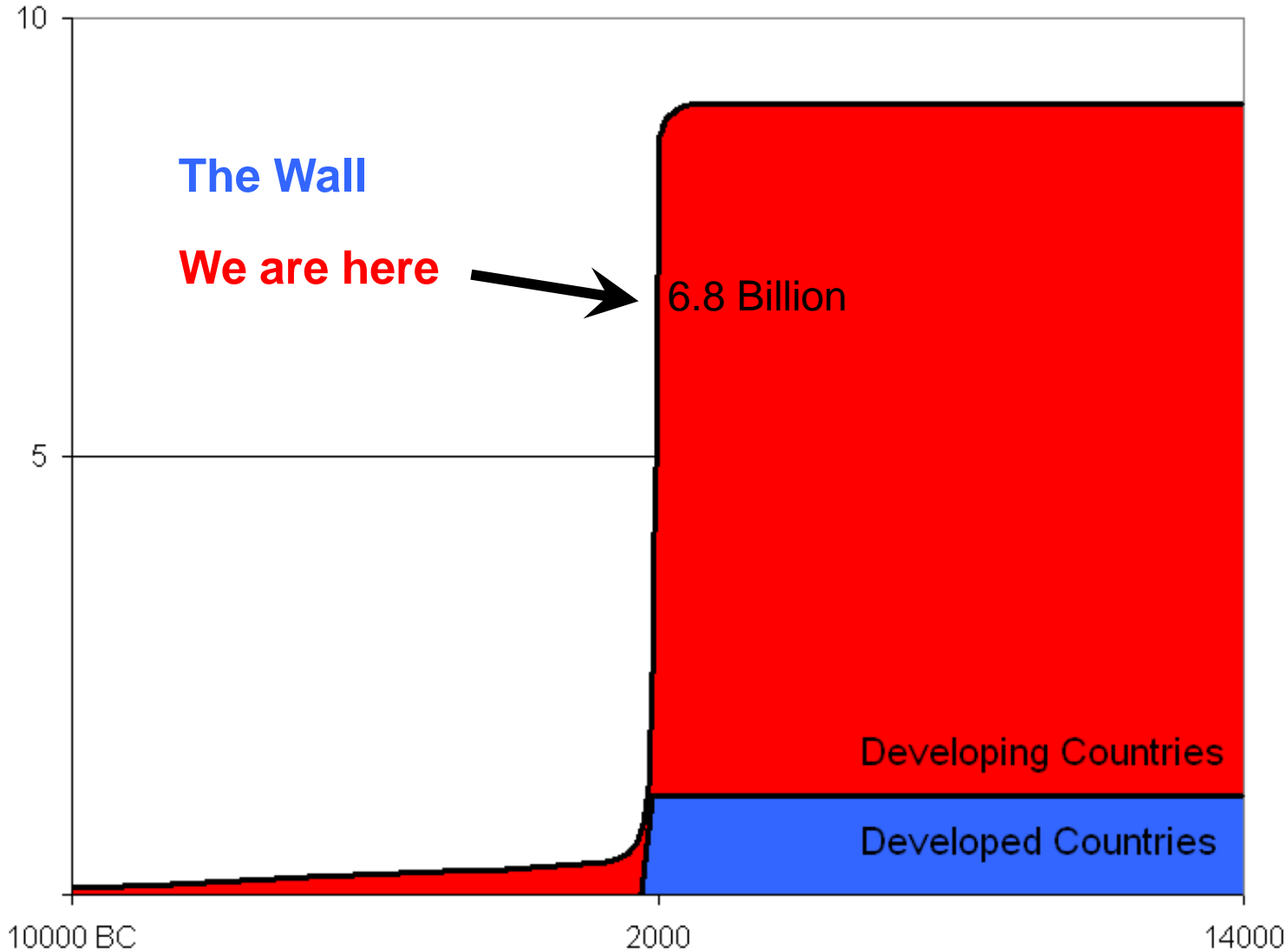
World Population Growth 1950-2050



Source: *World Population Prospects, United Nations Secretariat, 2006*

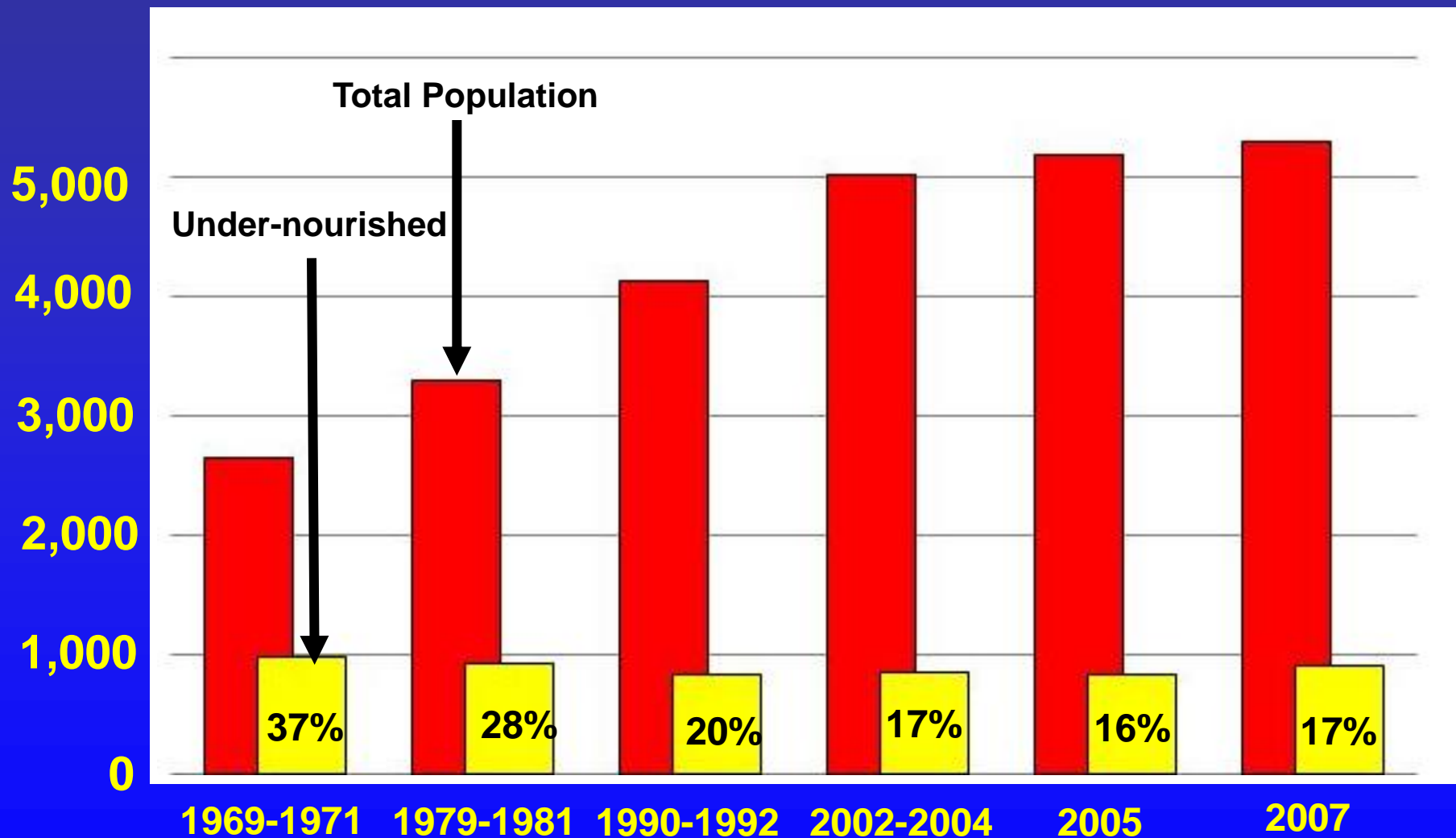
World Population 10,000 BC - 14,000 AD

Billion

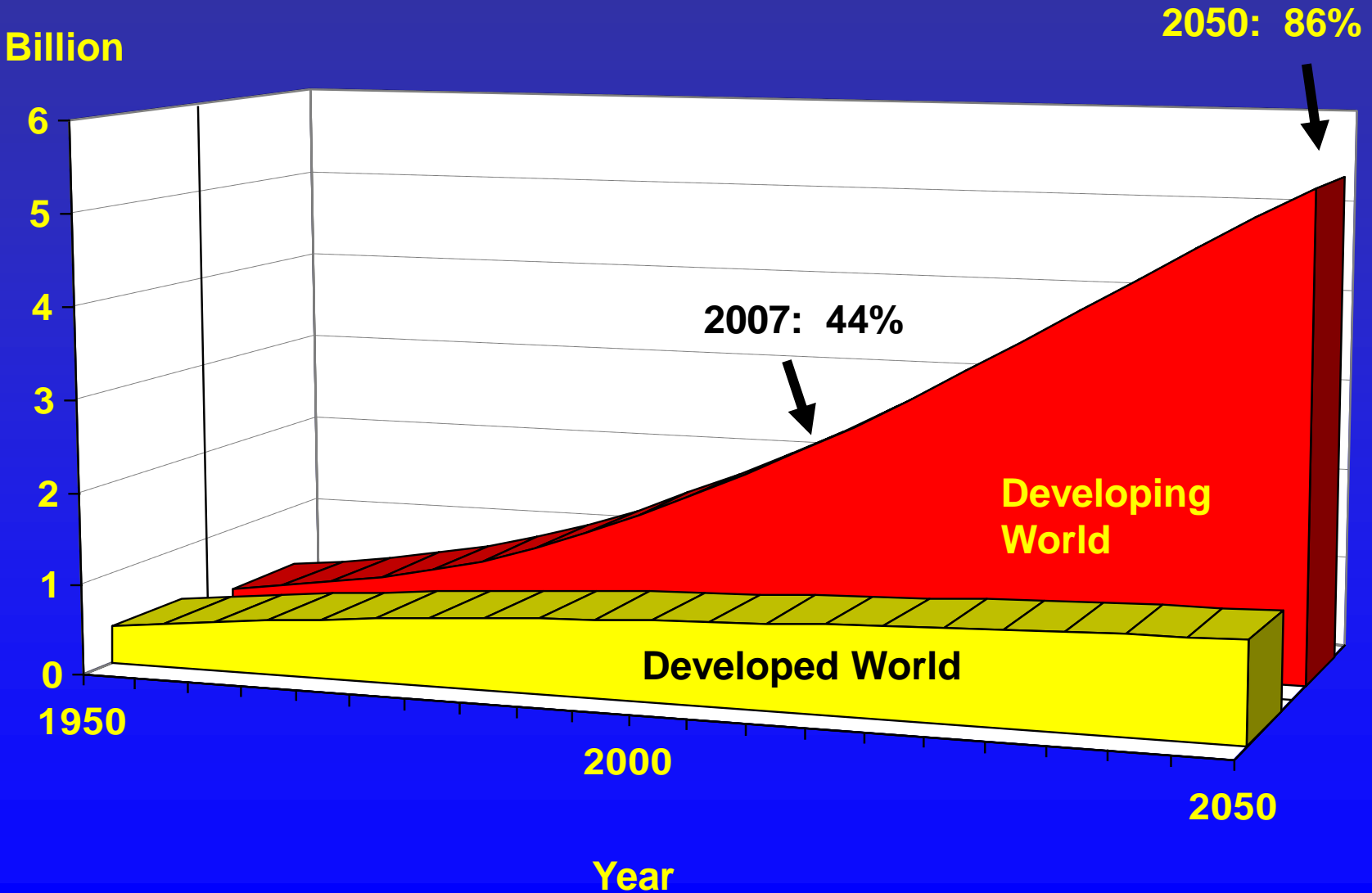


Source: World Population Prospects, United Nations Secretariat, 2006

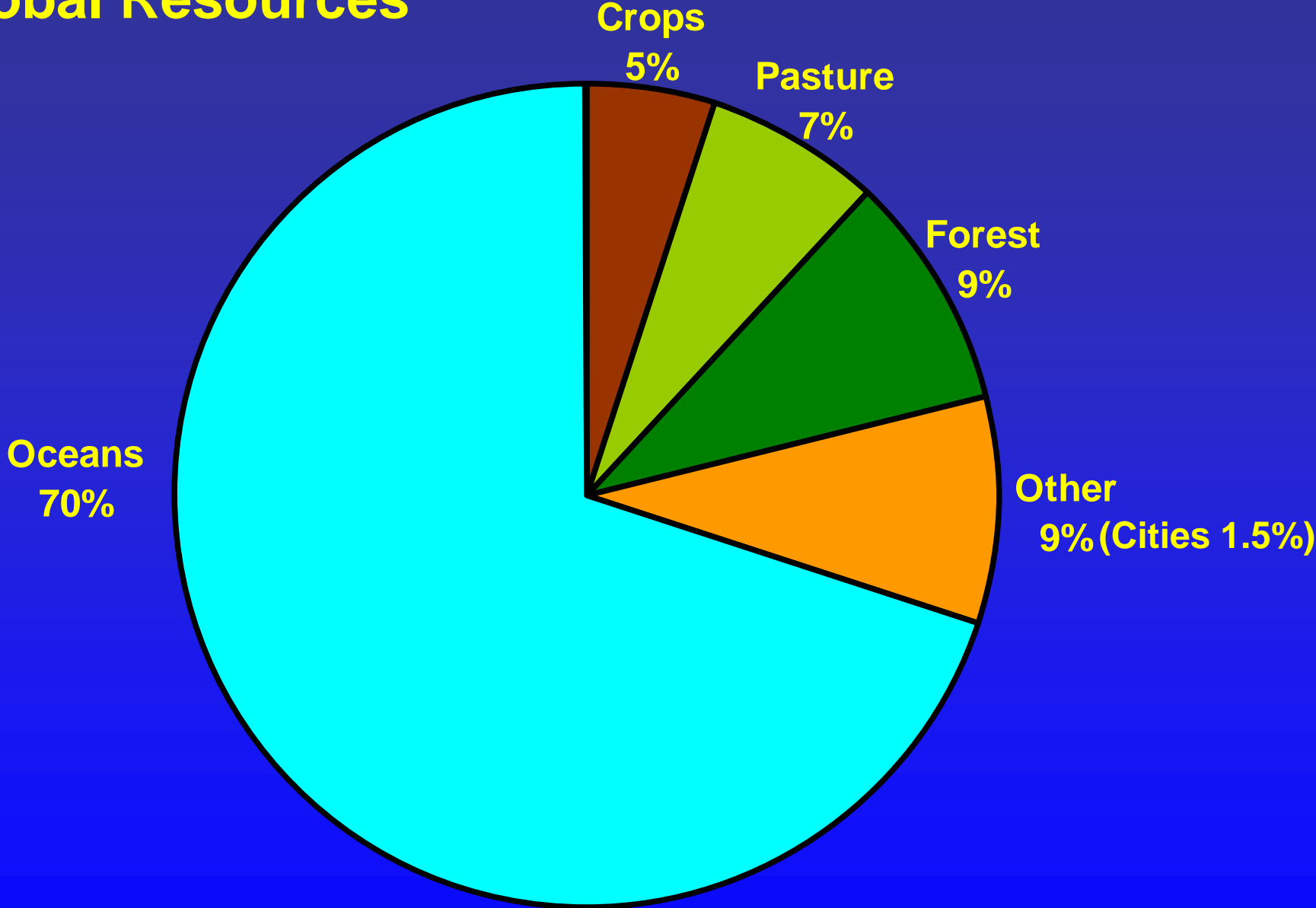
Under-nutrition in the Developing World



Urban Growth

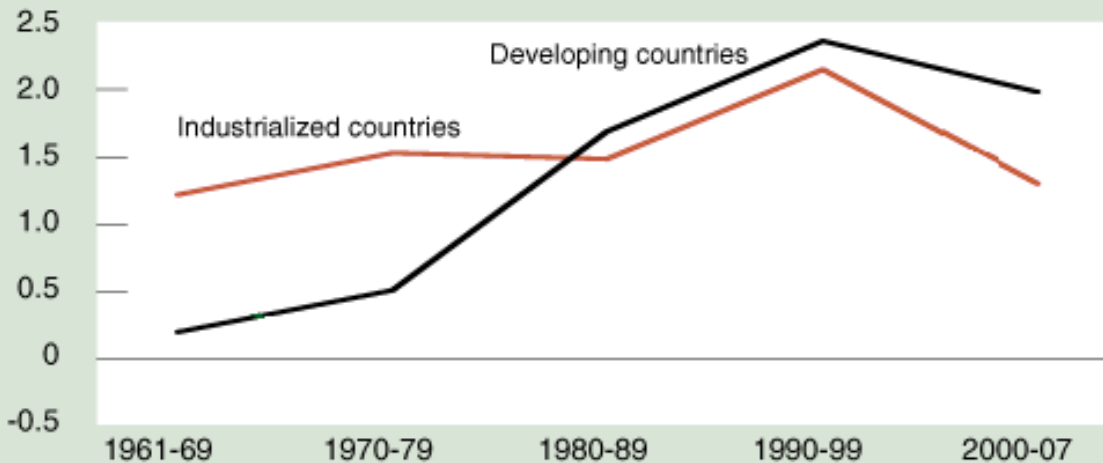


Global Resources



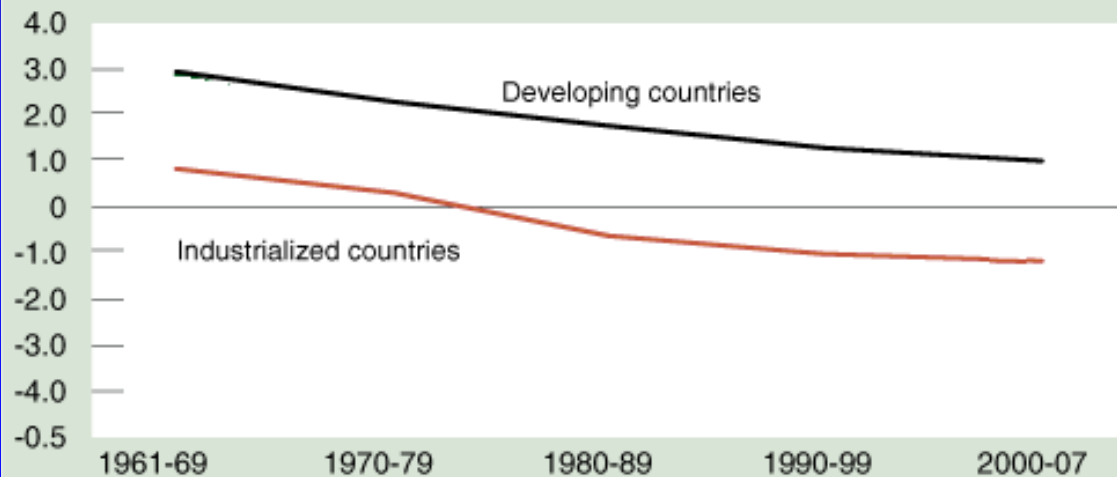
Agricultural total factor productivity growth has accelerated in developing and transition countries since the 1970s . . .

Average percent annual growth



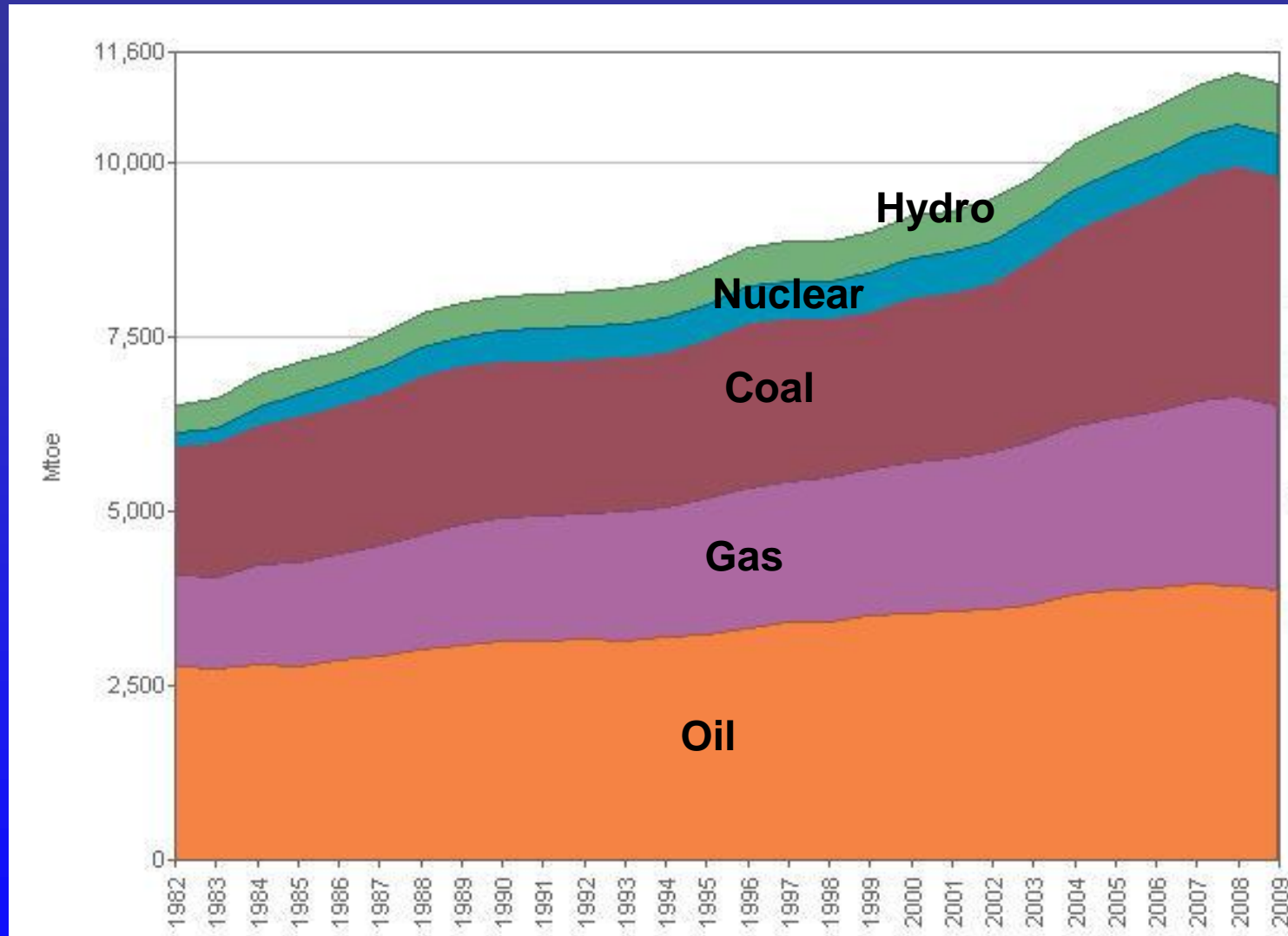
. . . while growth in agricultural resources (land, labor, capital, and materials) has slowed

Average percent annual growth



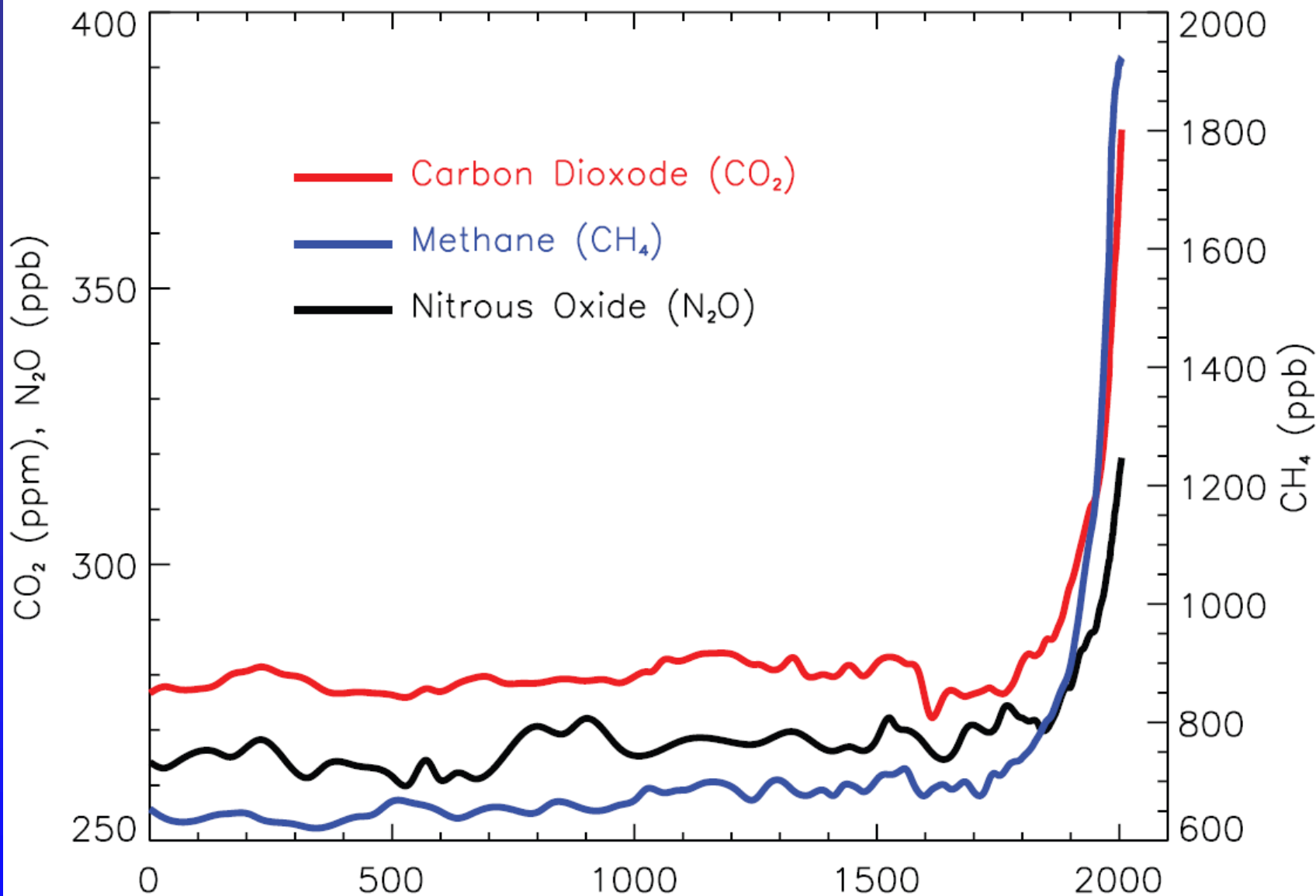
Source: USDA, Economic Research Service using Evenson and Fuglie (2010), *Journal of Productivity Analysis*, Vol. 33, No. 3, pp.173-190.

Global Energy Consumption (Mtoe) 1982 - 2009



Source: BP Statistical Review of World Energy

Concentrations of Greenhouse Gases from 0 to 2005



Source: IPCC, 2007.

Energy R&D Expenditure

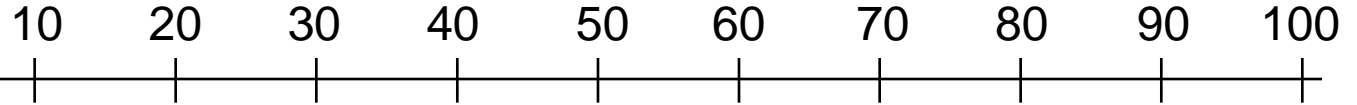
Nuclear	\$3000 million
Fossil	\$1000 million
Bio	\$250 million

Source: IEA, KBBE report

Oil, gas and biofuel breakeven economics

\$/bbl break-even price*

estimates



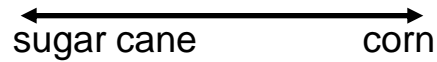
Oil



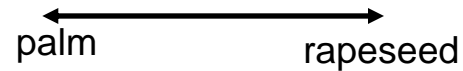
Gas



Bioethanol



Biodiesel

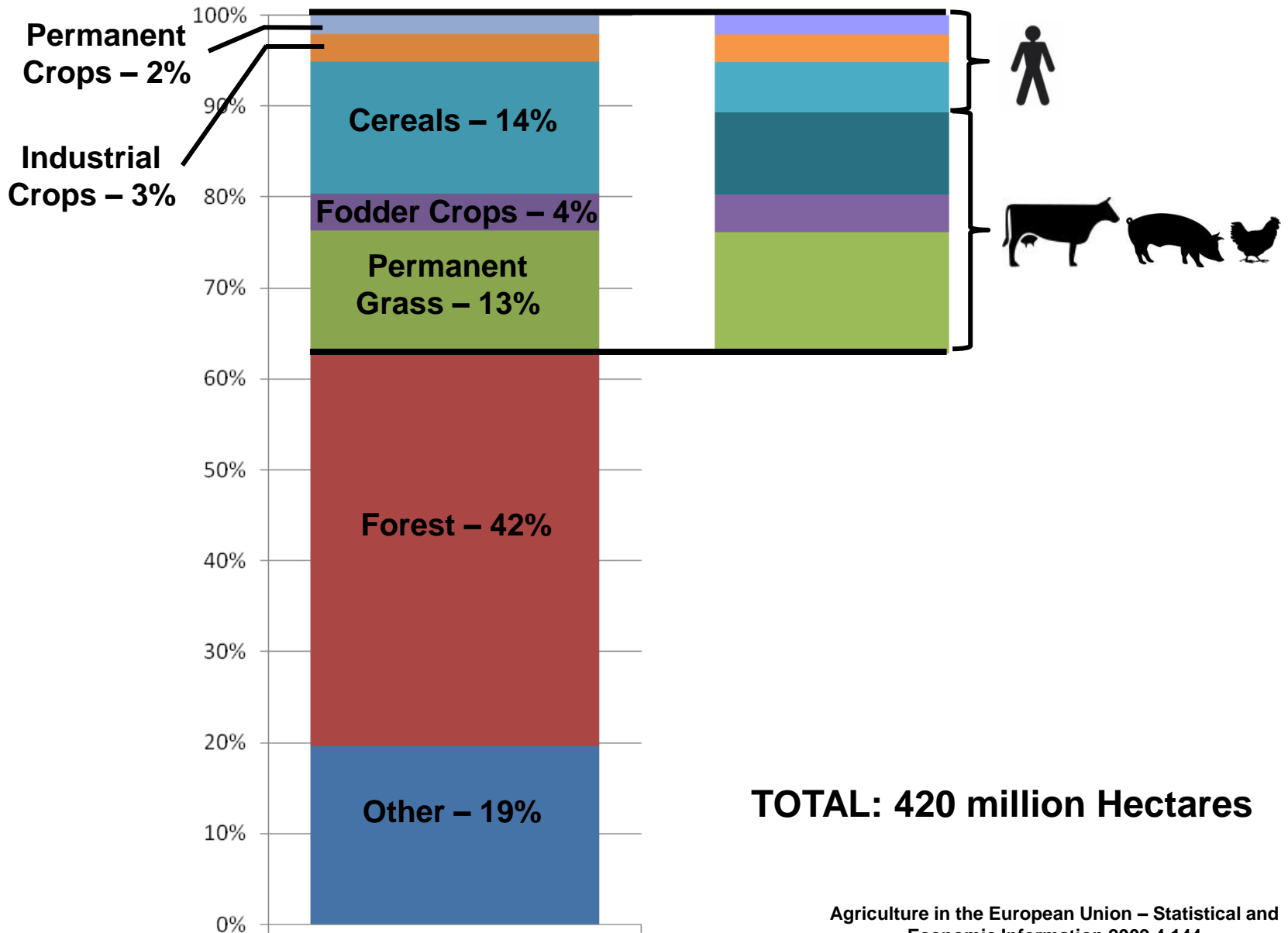


Cellulosic biofuels



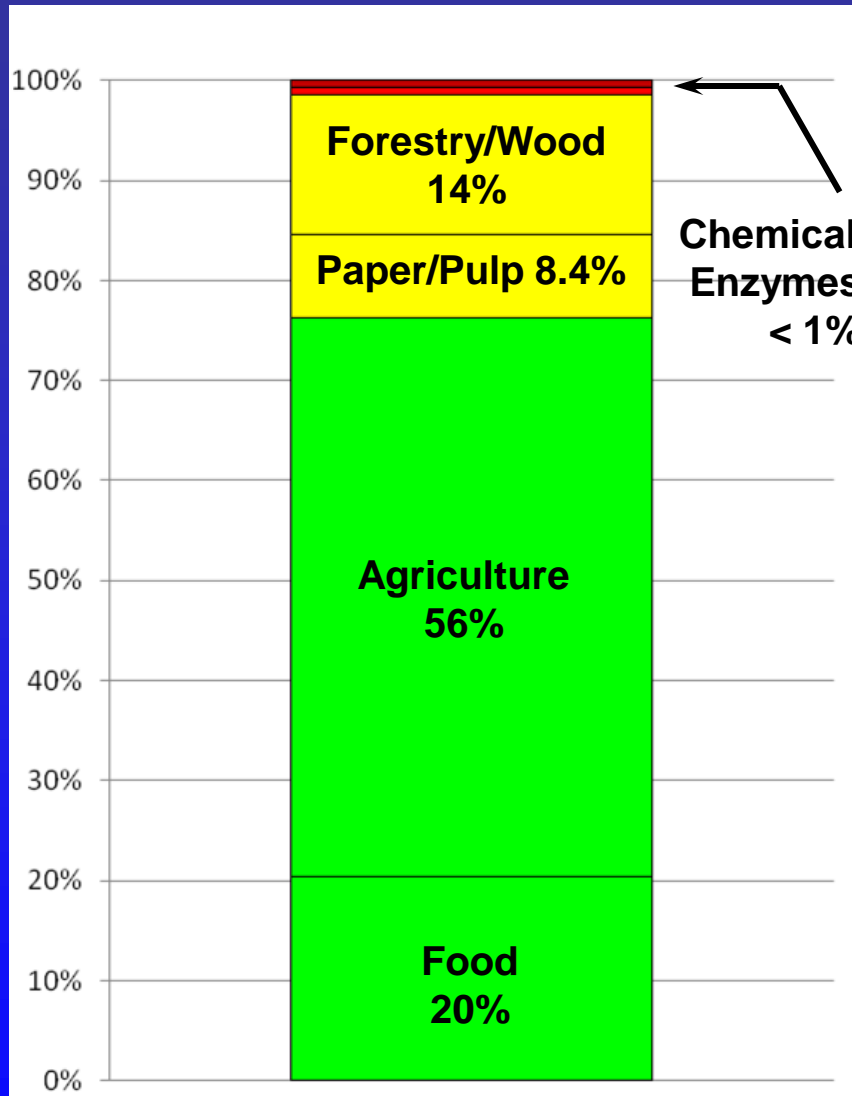
*Price which justifies investment
Source: McKinsey, AER

E.U. Land Resources

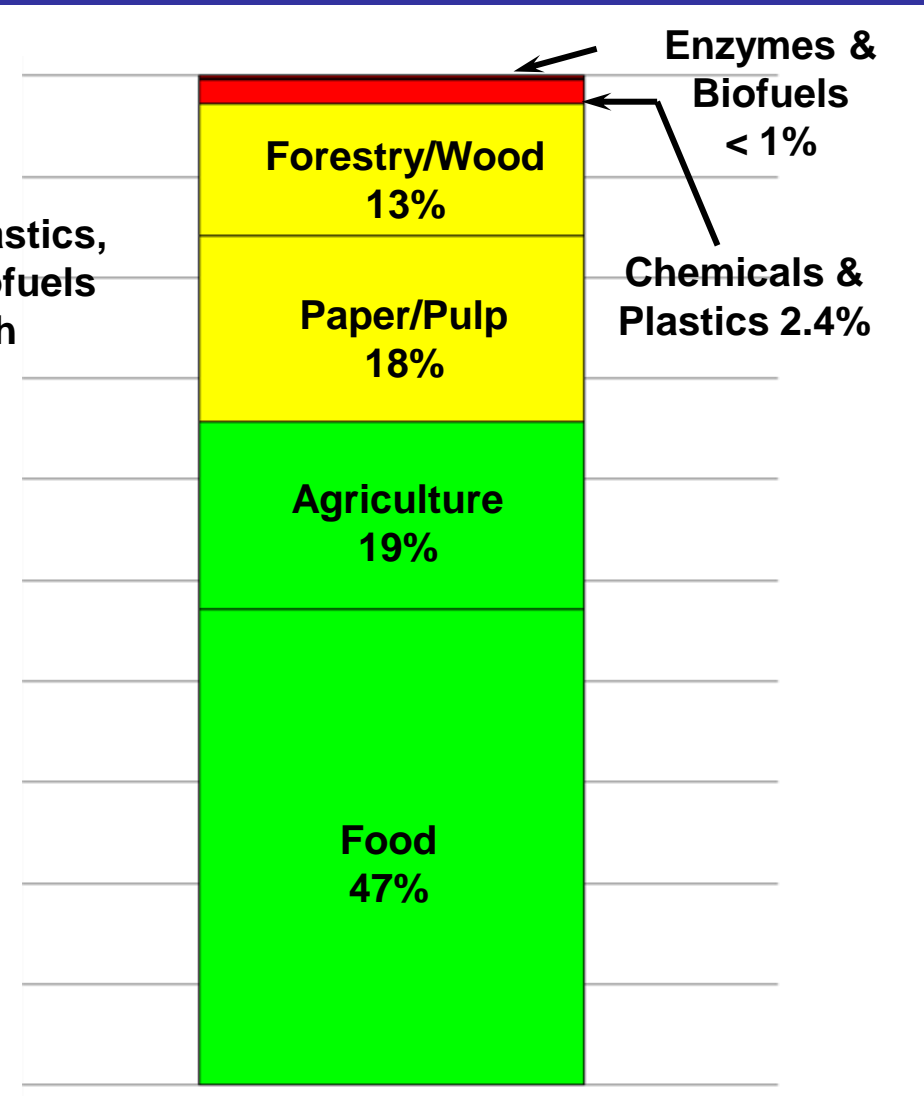


Employment by Sector

Turnover by Sector

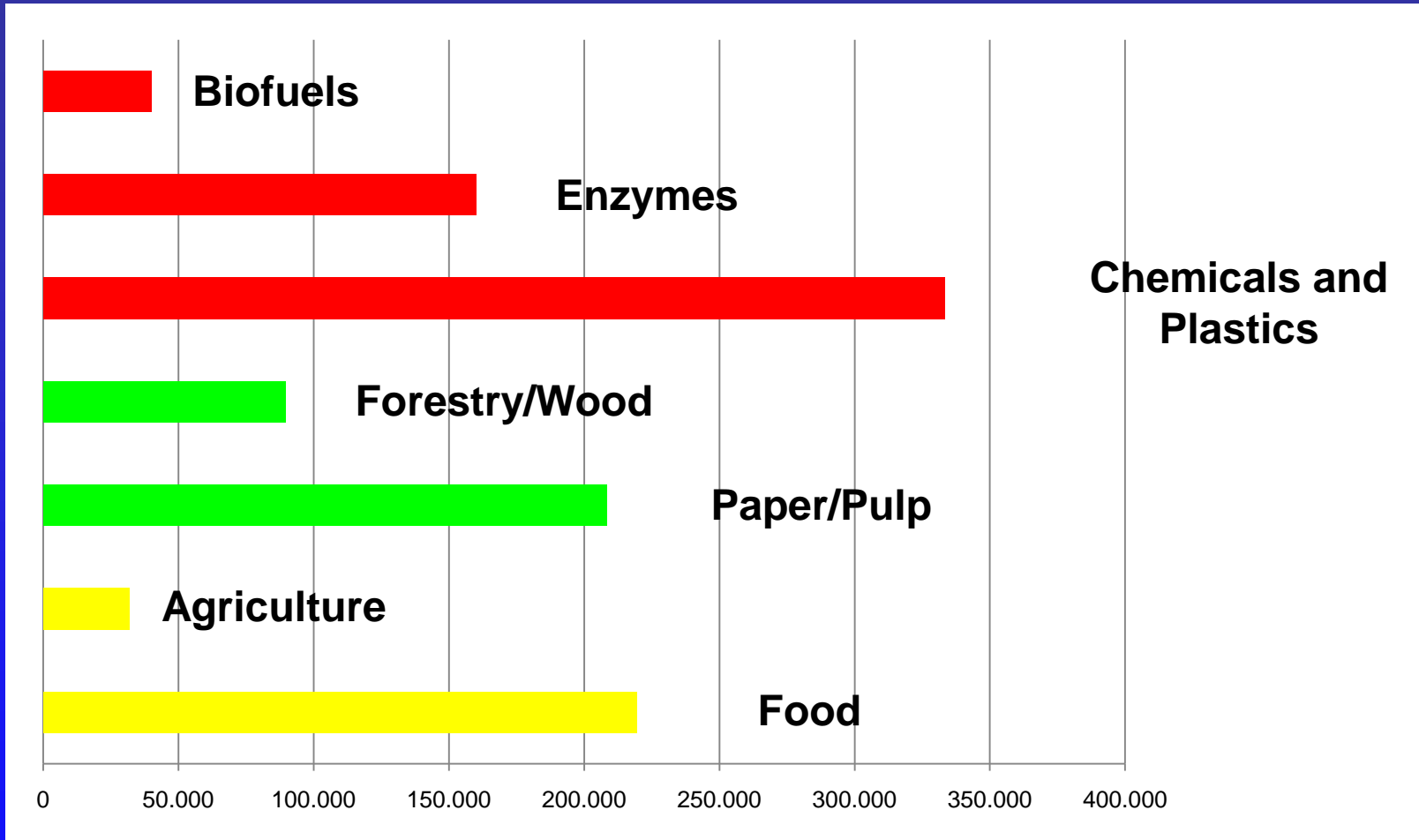


TOTAL: 21.5 million



TOTAL: € 2047 billion

Euro Turnover per Person Employed



The KBBE and the major Grand Challenges

- The impact of the social and demographic development on agriculture
- The impact of changes in lifestyles and eating habits
- The threat of climate change
- The growing pressure on water
- The limited resources of fossil fuel
- The need for sustainable development
- The demand for safer and healthier foods
- The prevention of epizootic and zoonotic diseases
- Etc.

Achievements 2005-2010 (1)

General

- Close collaboration of the 9 European Technology Platforms in the area of the KBBE: identifying synergies and multidisciplinary research, creating awareness, etc. (cfr. Becoteps, Star-Colibri)

Feedstock

- Yields are constantly increasing
- Advanced technologies for agronomic use and green biotechnology are evolved in R&D as an opportunity for the optimisation of crops
- Bioenergy and biofuels have high growth rates due to an optimised political framework.

Achievements 2005-2010 (2)

Food

- European Technology Platform “Food for Life” and 36 National Food platforms were set up, resulting in more research programmes, research infrastructures, training and support to SMEs
- Increased and shared knowledge due to reinforced cooperation and public-private partnerships.

Bio-based products

- EU became leading region for the development and production of enzymes
- Growing focus on biorefineries (more than 300 research projects in the EU)
- EU action plan on Key Enabling Technologies (KET) includes industrial biotechnology
- Lead Market Initiative (LMI) for Biobased Products.

Challenges (1)

General

- Need to balance economic, social and environmental issues in land and water use
- From a sectoral approach towards a more integrated approach of the KBBE
- Need for a public debate on the public acceptability of modern technologies (e.g. GM, animal cloning, synthetic biology, etc.)

Feedstock

- Obtaining a worldwide food security, as well as security for feedstocks for a sustainable bio-based industry
- An intelligent and new discussion on Food- versus Non-Food-Crops.
- Handling the feedstock competition on biomass for energy versus industrial material use.
- Deployment of existing technologies in agriculture, and increasing research in agronomic sciences and breeding technologies (incl. green biotechnology).

Challenges (2)

Food

- Research in health, food and diet-related diseases is both complex and fragmented
- Authorisation for novel food products: long procedures and costly (in particular for SMEs)
- Need for new communication tools to increase trust in the food chain
- Optimising and increasing technology transfer towards SMEs

Bio-based Products

- Development of new innovative bio-based products is costly and R&D intensive
- US, Brazil, China and others are supporting large scale demonstrators in which many European companies already participate. What about Europe?
- In contrast to biofuels, there is currently no European policy framework to support bio-based materials
- Lack of widely accepted schemes to assess and confirm sustainability is a significant barrier to consumer and government confidence.

Needs

1. Need for an **integrated policy** for the KBBE: agriculture, research and innovation, environment, energy, climate change, trade, health and consumer policy, etc.
2. **Research and innovation**: Better integration of the different research areas; Better coordination between Academia and Industry; Clusters and public–private partnerships are essential to stimulate innovation; Public support for the development of demonstration projects
3. Develop measures to make and **innovative SMEs** economic-sustainable: Improve access to finance; Financing “proof of concept” studies; Supporting tech-transfer, etc.
4. A strong EU common **policy for agriculture** for both food and non food-crops
5. Need to develop and implement policies **stimulating the market** for KBBE products, and support measures to **stimulate the reconversion** towards low-carbon renewable-based production systems
6. A strong need for science based **sustainability criteria**

Dublin: European City of Science 2012

Thank You

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