



平成 20 年度 (第 17 回) ブループラネット賞
受賞者記念講演会

**2008 Blue Planet Prize
Commemorative Lectures**

クロード・ロリウス 博士

講演スライド集

「気候と環境—半世紀にわたる南極大陸での探検と調査—」

ジョゼ・ゴールデンベルク 教授

講演スライド集

「持続可能なエネルギーの未来」

Dr. Claude Lorius

Slides for the Lecture

“Climate and Environment

–50 years of adventures and research in Antarctica–”

Professor José Goldemberg

Slides for the Lecture

“A sustainable energy future”

財団法人 旭硝子財団

THE ASAHI GLASS FOUNDATION

ジョゼ・ゴールデンベルク教授

講演スライド集

「持続可能なエネルギーの未来」

Professor José Goldemberg

Slides for the Lecture

“A sustainable energy future”

A sustainable energy future

Prof. José Goldemberg
University of São Paulo
São Paulo, Brazil

Easter Island



Figure 1

The action of humankind on the environment

<u>Geological forces</u> (wind, erosion, volcanic eruptions, etc.)	50 billion tons/year
<u>Human activities</u>	54 billion tons/year
world population	6,75 billion
material used "per capita"	8 tons/year

Table I

World Primary Energy Supply (2004)
(shares of 11.4 billions tons of oil equivalent)

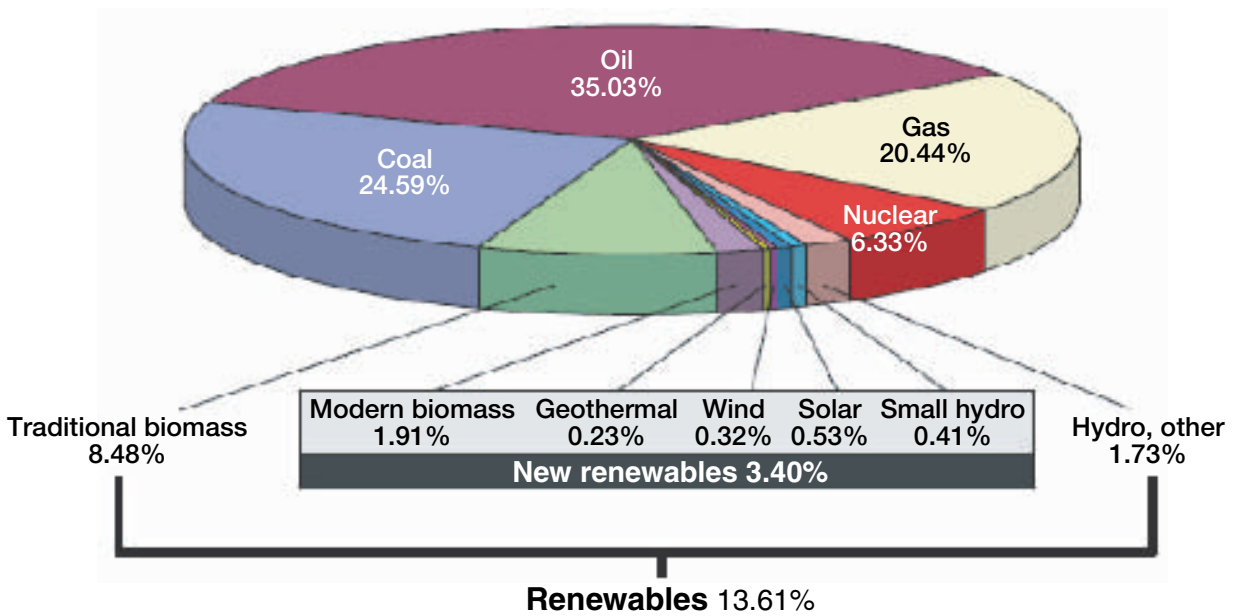


Figure 2

Projections of the energy consumptions until 2030

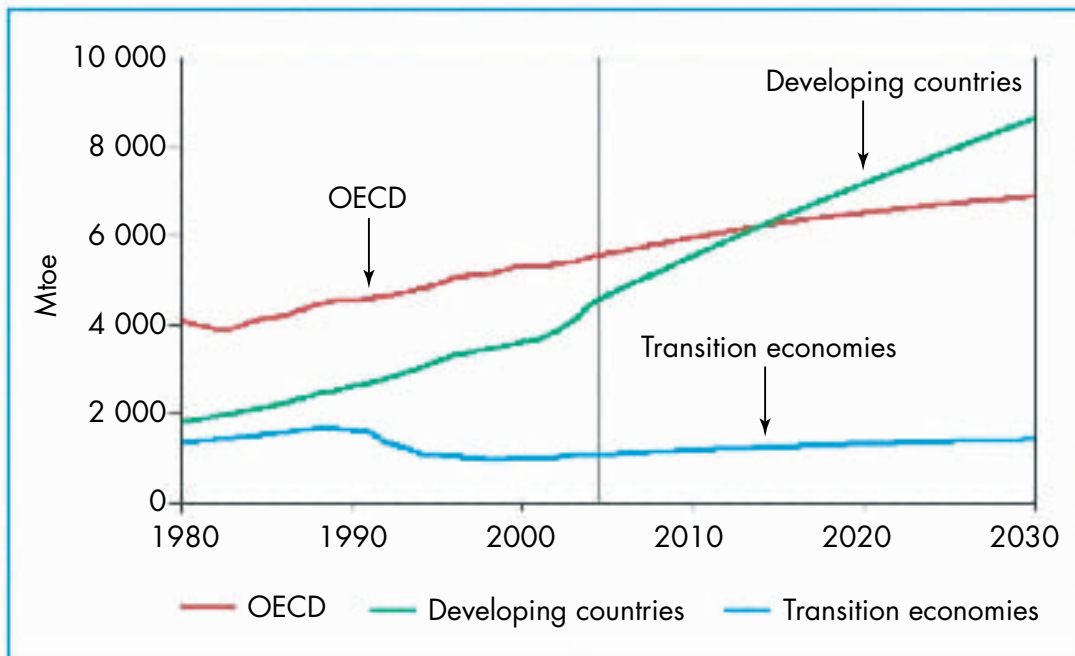


Figure 3

SUSTAINABILITY CRITERIA

- Physical, related to securing supplies adequate to meet future energy needs and extending their lives;
- Environmental, related to the use of present supply sources at local, regional and global levels including averting global warming and catastrophic climate change;
- Geopolitical, related to security risks and conflicts that could arise from an escalating competition for unevenly distributed energy resources and
- Equitable, not strictly an energy problem, but similar to the one of access to food and other amenities provided by modern civilization.

Evolution of the Energy Consumption “per capita” (1971 – 2004)

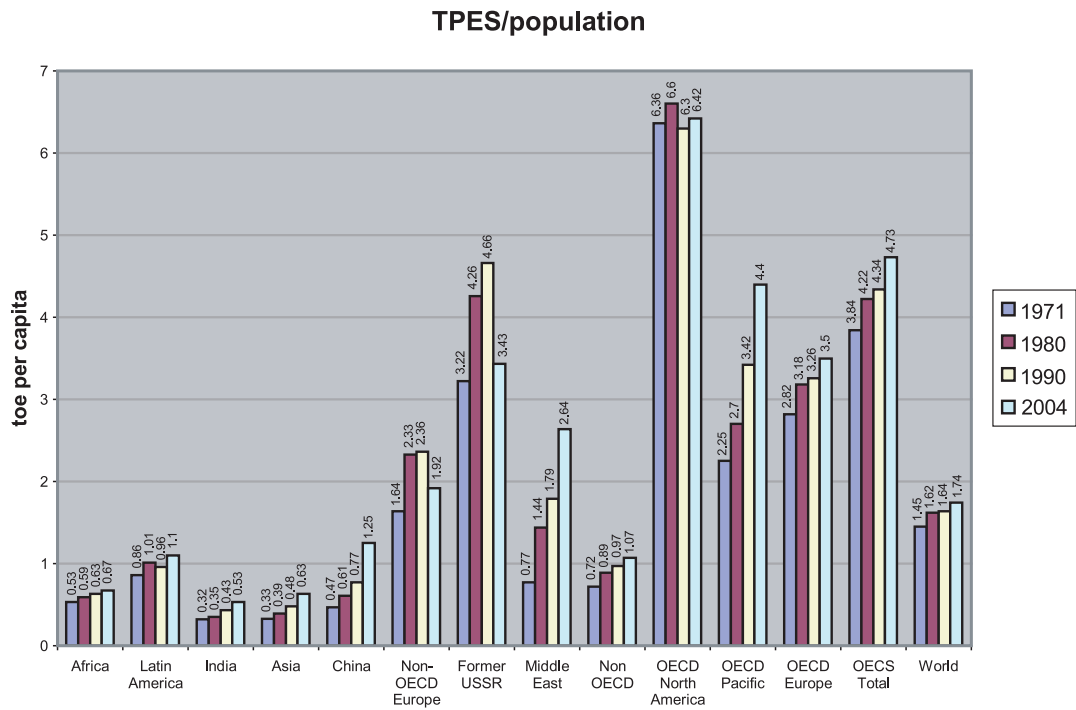


Figure 4

Relationship between HDI and per capita energy use, 1999/2000

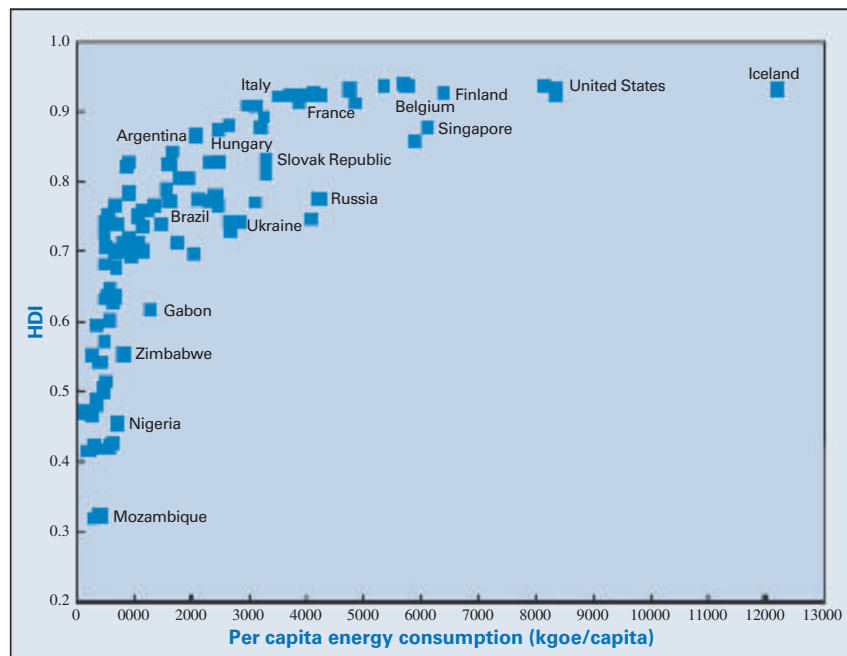


Figure 5

STRATEGIES FOR INDUSTRIALIZED COUNTRIES

- i. the reduction of consumption in the industrialized countries through energy efficiency measures that can lead to supplying the energy needed for the desired end uses with less primary energy inputs and
- ii. the introduction of renewable energy sources in large scale.

**Energy economy in the OECD
(1973 – 1998)**

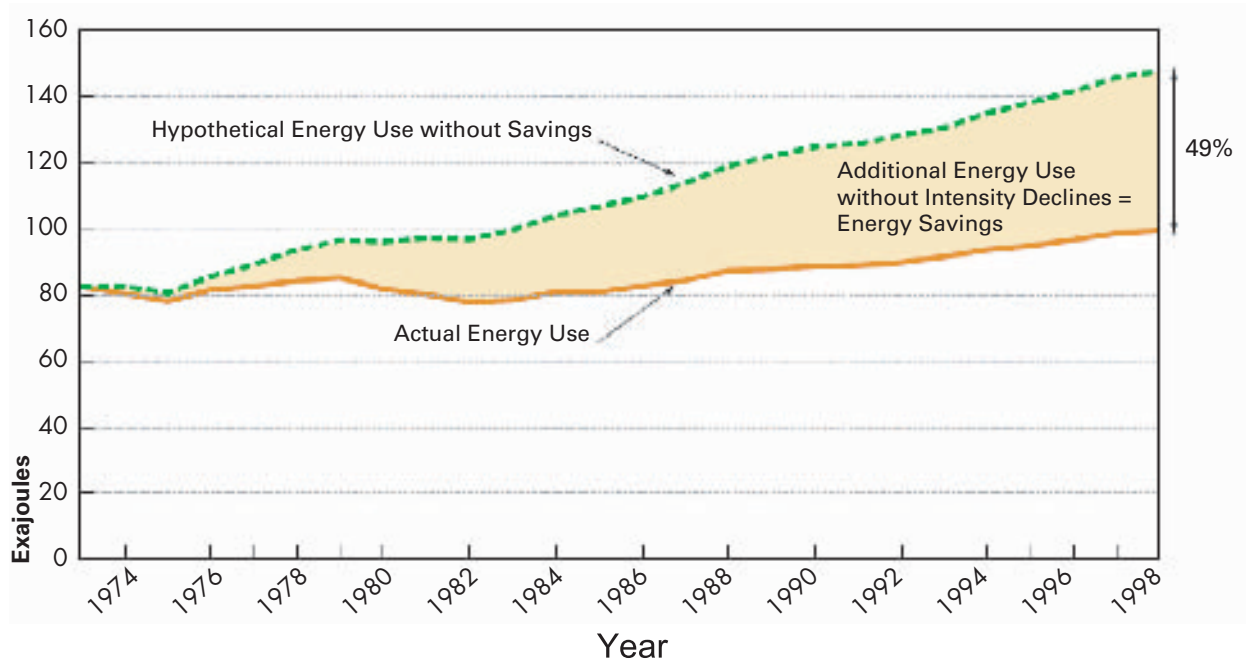
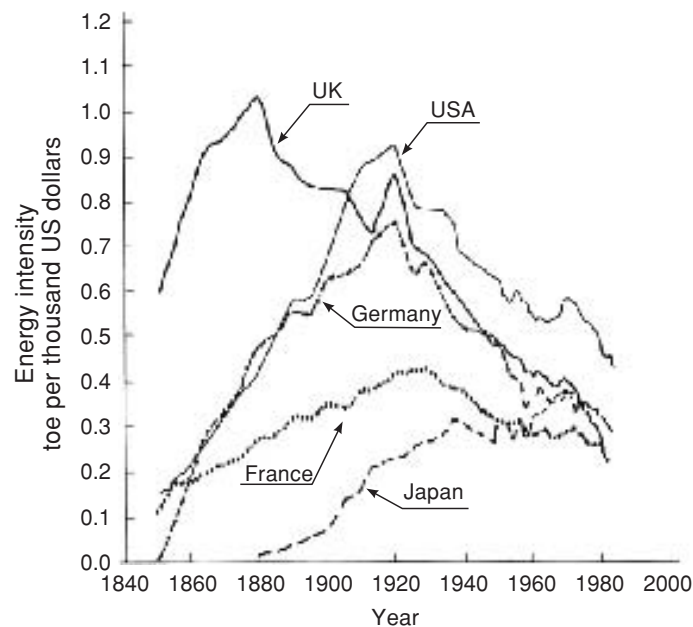


Figure 6

STRATEGIES FOR THE DEVELOPING COUNTRIES TECHNOLOGICAL LEAPFROGGING

Rather than mimicking the industrialized nations, going through an economic development phase that is dirty and wasteful creating an enormous legacy of environmental pollution, developing countries can leapfrog over some of the steps originally followed by industrialized countries and incorporate currently available modern and efficient technologies into their development process. Less-developed countries are important theaters for innovation and leapfrogging, especially in energy-intensive basic material industries such as steel, chemicals and cement.

Long-term trends in energy intensity of industrialized countries*.



*Commercial energy includes all energy that is the subject of monetary transactions (generally coal, oil, gas, nuclear and hydro). Only commercial energy is considered in this graph.

Figure 7

Average Annual Growth Rates of Renewable Energy capacity, 2002-2006

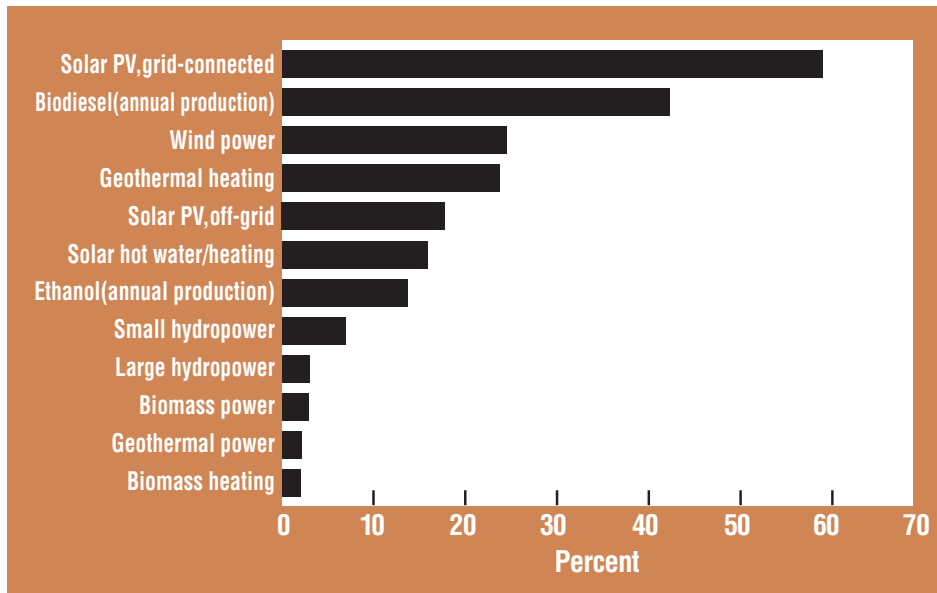


Figure 8

Modern renewables (including small hydro, excluding large hydro) Projections for 2010 and 2020 based on growth 2001-2005 (REN21 and WEA 2004 Update)

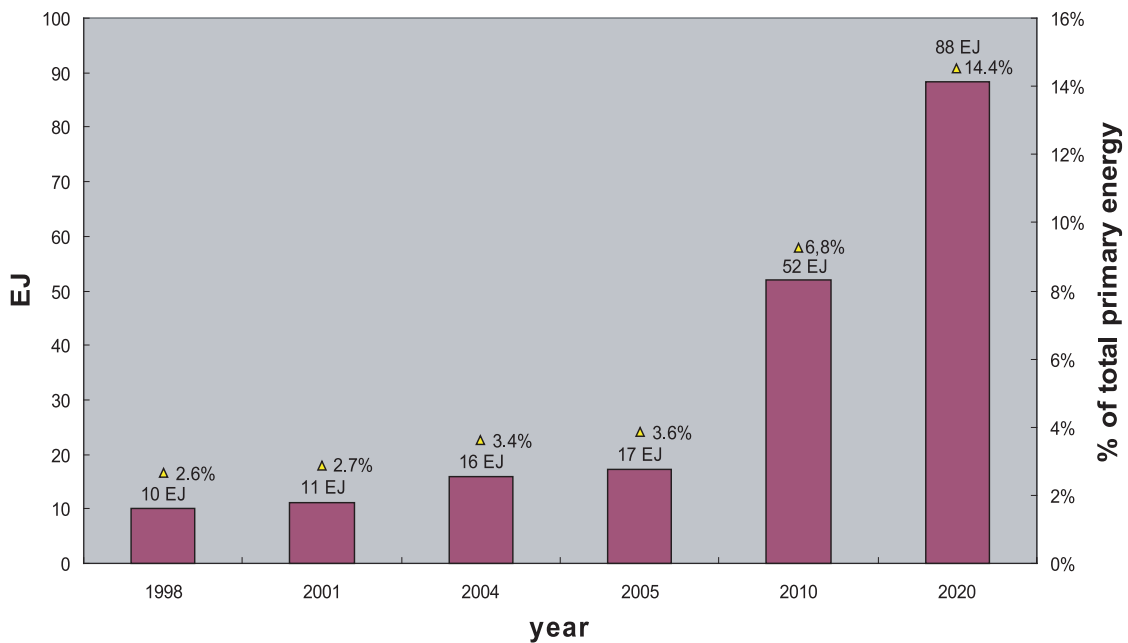


Figure 9

THE ECONOMIC COMPETITIVENESS OF ALCOHOL FUEL COMPARED WITH GASOLINE

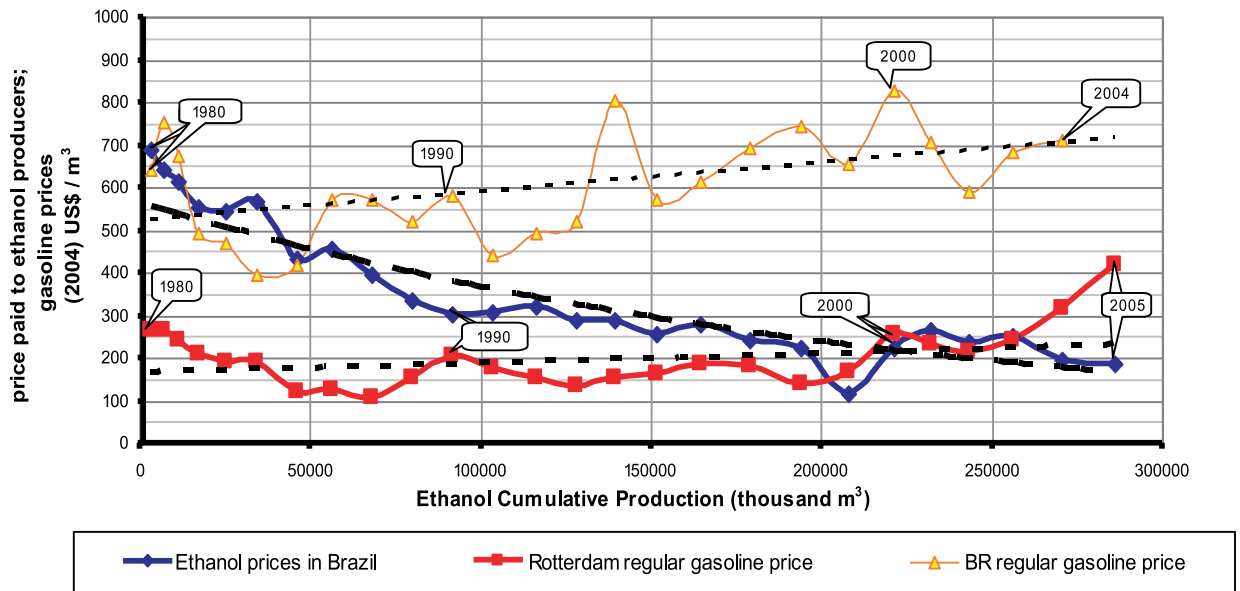


Figure 10

USES OF ETHANOL IN AUTOMOBILES

- as an additive replacing petroleum derived additives at a few percentages up, without any changes in current motors or
- as pure ethanol in adapted motors

Some policy options to speed-up the diffusion of renewables

- Rate-based incentives (e.g. feed-in tariff)
- Investment subsidies
- Renewable Portfolio Standards (RPS)
- Carbon tax
- CO₂ emission caps (plus tradable permits)
- Clean Development Mechanism
- and more...

Source: WEA, 2000

Status end 2005 (plus estimates for 2007):

- | | |
|--|---------|
| - Countries with policy targets: | 52 (66) |
| - States / provinces / countries with feed-in tariffs: | 41 (46) |
| - States / provinces / countries with RPS policies: | 38 (44) |
| - States / provinces / countries with biofuels mandates: | 38 (53) |

Source: REN 21, 2007

Table II