

持続可能なアジア社会のための科学技術

Science and Technology for Sustainable Asia



February 27, 2009


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21世紀のパラダイム

Paradigm of 21st century

The Finite and Shrinking Earth

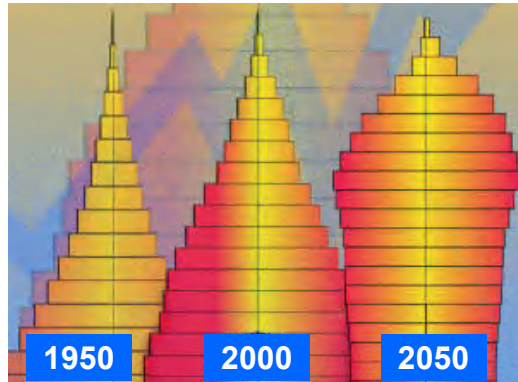


20th Century
The Infinite Earth

21st Century

- Climate Change
- Globalization
- Pollution
- Food & water ...

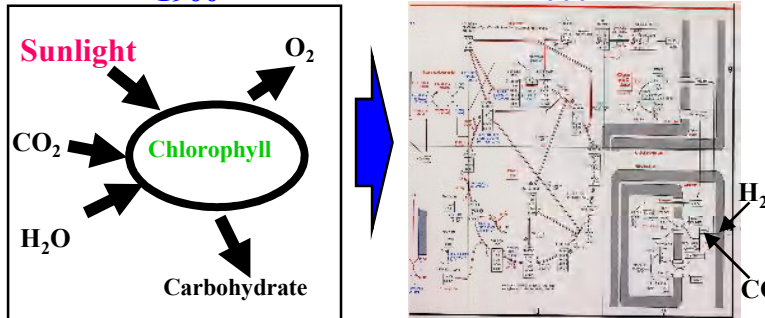
Aging Society



1950 2000 2050

- Longevity
- Low Fertility
- Healthcare
- Social Security
- Work Sharing
- Barrier-Free...

Explosion of Knowledge



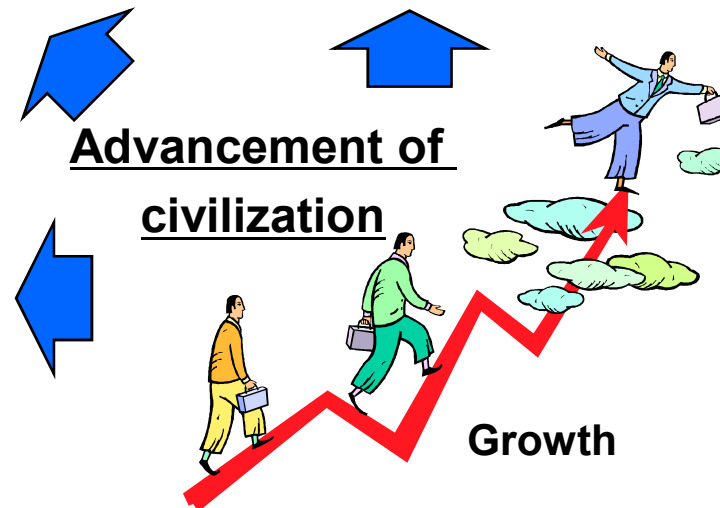
1900 2000

Sunlight CO_2 H_2O Chlorophyll O_2 Carbohydrate

Photosynthesis

H_2O CO_2

Advancement of civilization



Growth

Earth × 100 years perspective

地球の未来100年、約40年後の2050年に何が起こるか？
What will happen within 100 years?

現在はパラダイムの
転換点
Paradigm shift

「有限の地球」
“Finite Earth”

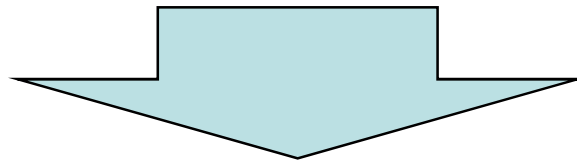
「人工物の飽和」
Saturation of artifacts

「地球温暖化の進行」
Global warming

「資源の欠乏」
Depletion of resources

Vision 2050

- エネルギー効率3倍
Improve energy efficiency by three times
- 再生可能エネルギー2倍
Double the use of renewable energy
- 物質循環システムの構築
Establish recycling system of materials



理論的技術的に適切で、国際合意が可能
Feasible But Requires an orchestrated effort

Saturation of artifacts: automobile as an example

Japan in 2008 : scrapped \doteq sales

World in 2050 : World will become like Japan

Japan in 2008

人口 Population

130 million

自動車 Automobile

58 million

平均寿命 Average time before disposal 13 years

年間販売台数
Annual auto sales

4.4 million

年間廃車台数
Annual auto disposal

4.4 million

蓄積速度
Accumulation rate

+

置換速度
Displacement rate

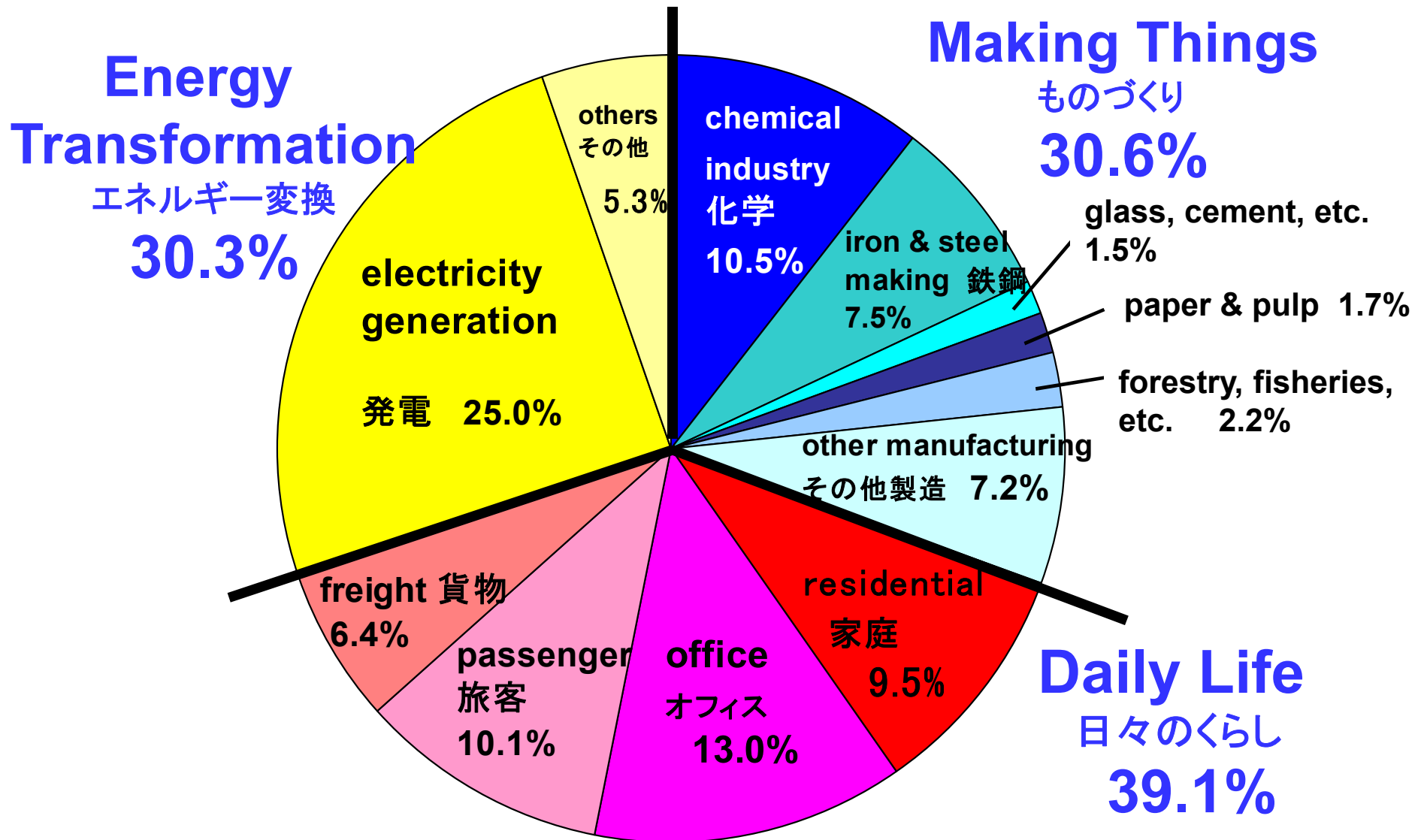
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生産速度
Production rate

廃車に新車の資源

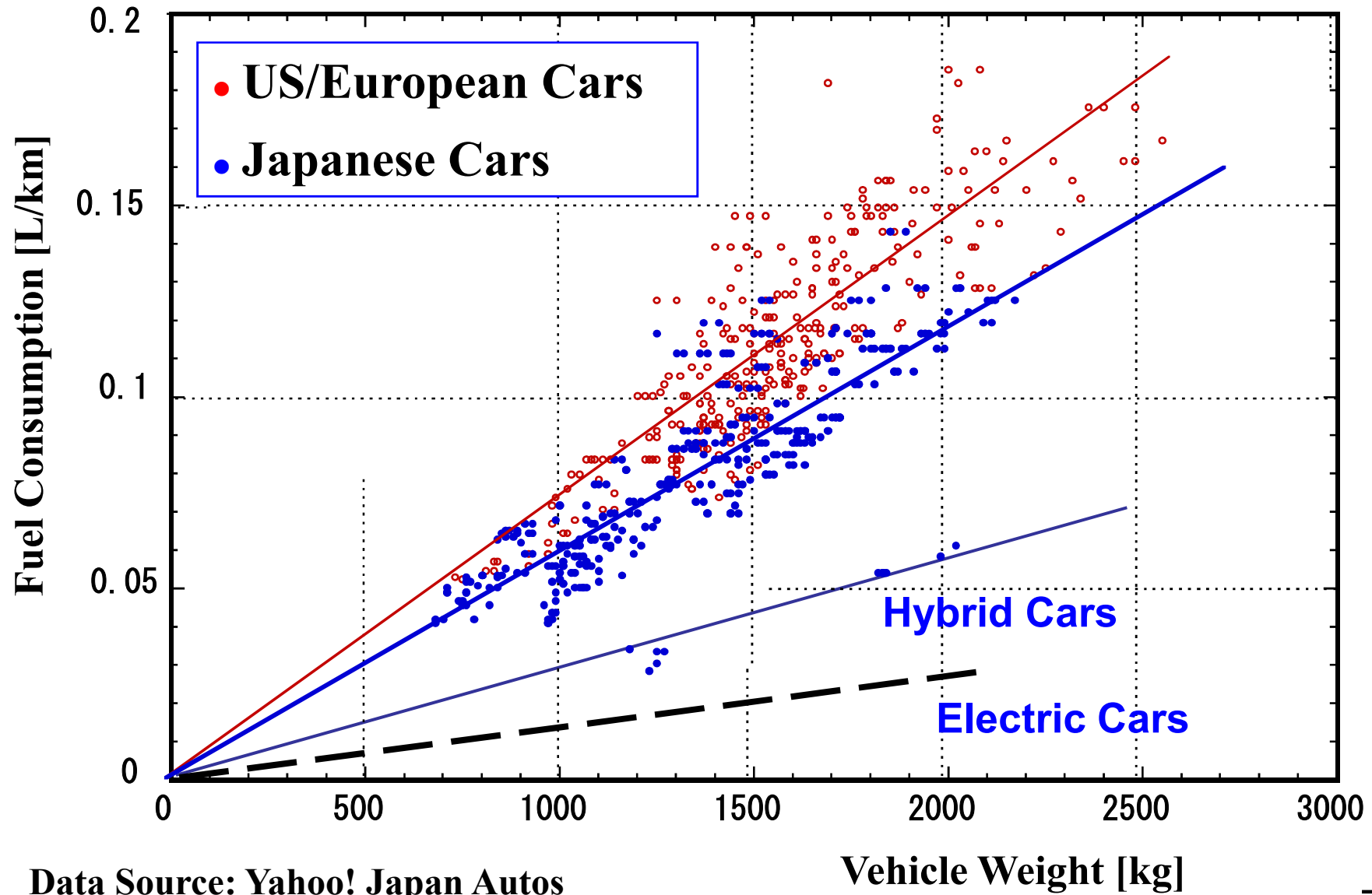
Disposed car is a resource for a new car.

Distribution of energy consumption in Japan



Notes: Data from 2007. The energy consumed in “energy transformation” is mostly energy in power plants that does not become electricity or that is used internally in the plant. 6

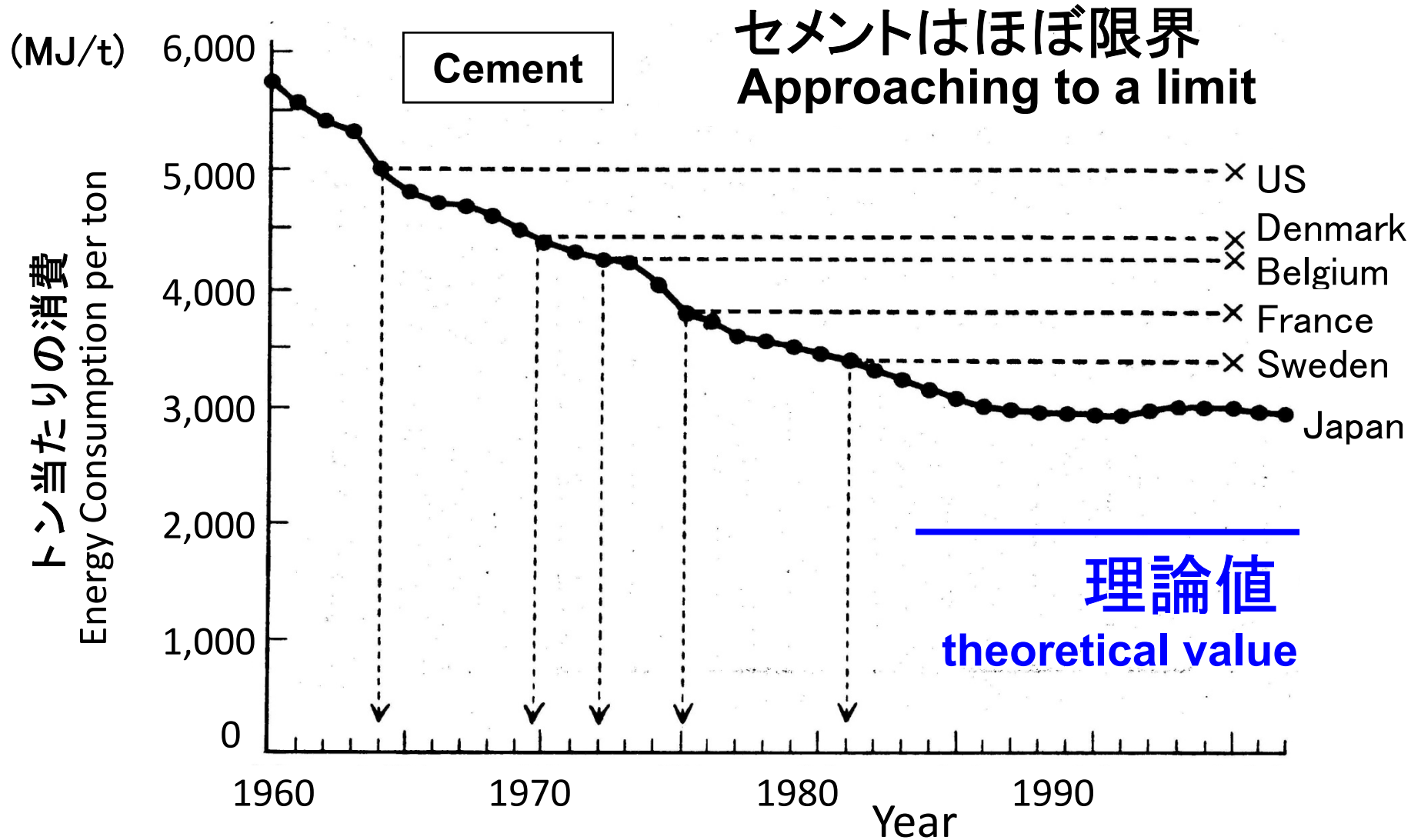
自動車は10分の1になる *Automobile energy consumption to 1/10*



Data Source: Yahoo! Japan Autos

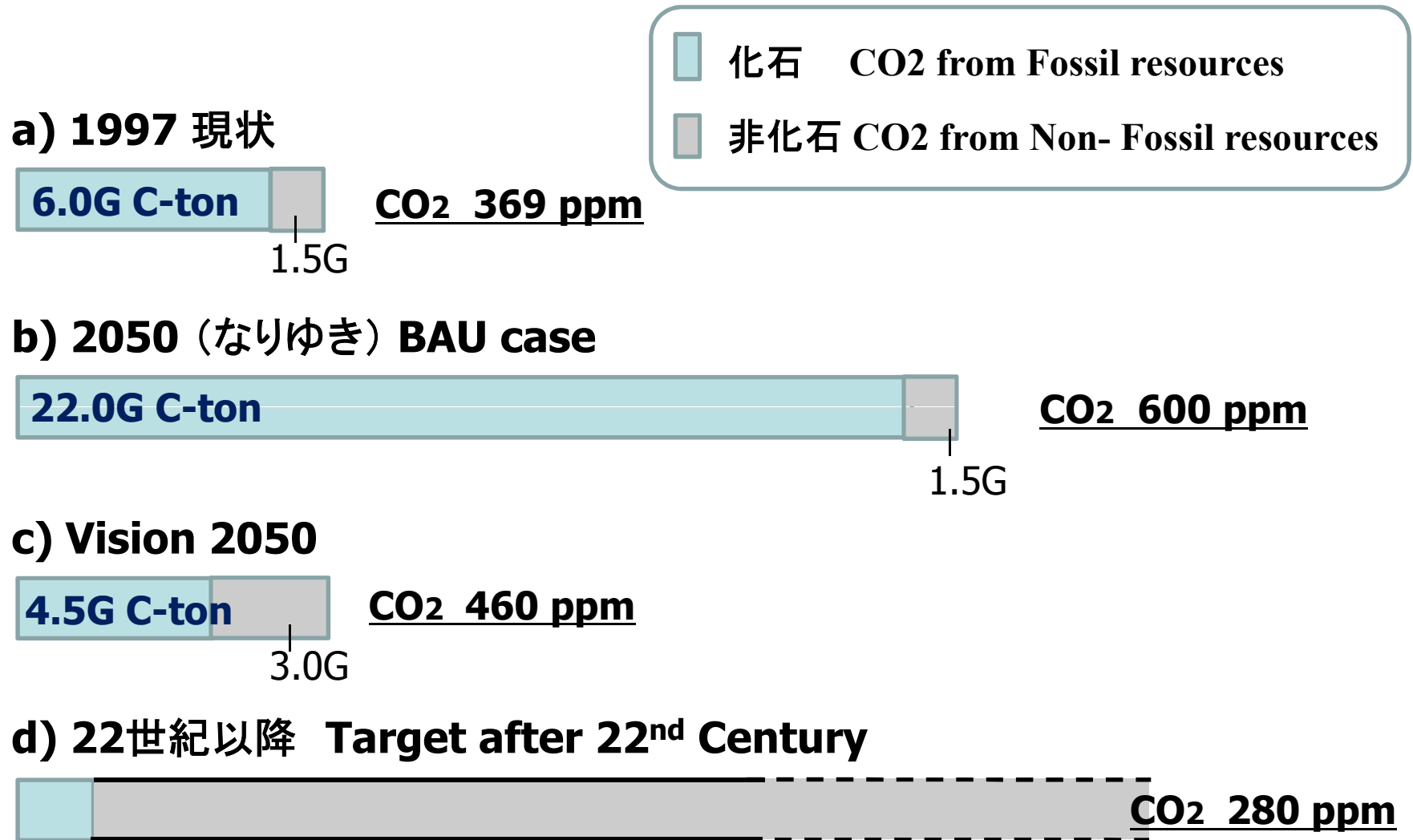
Vehicle Weight [kg]

Technology transfer can reduce emission



Source: Japan Cement Association

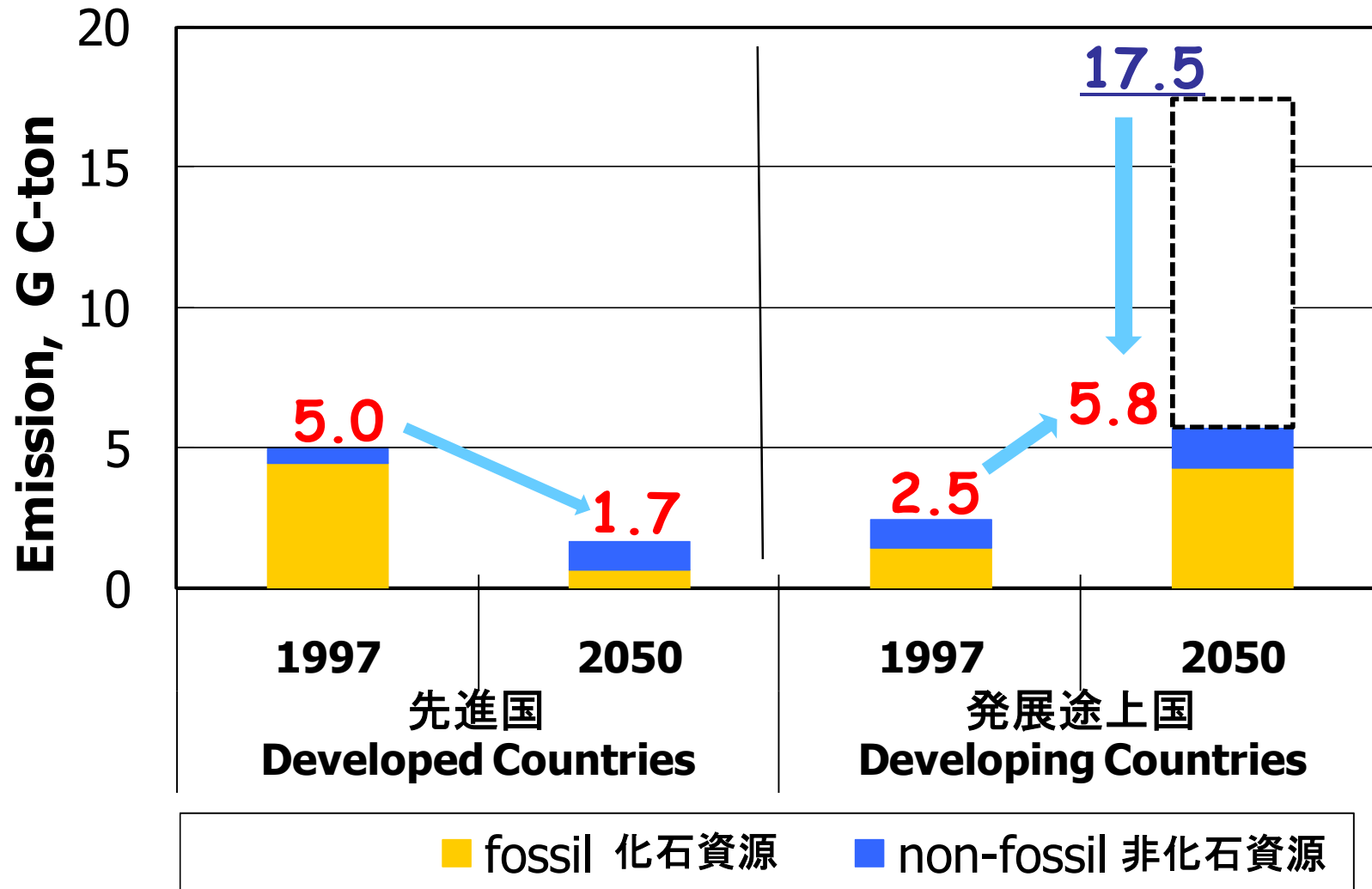
Energy Scenario and CO2



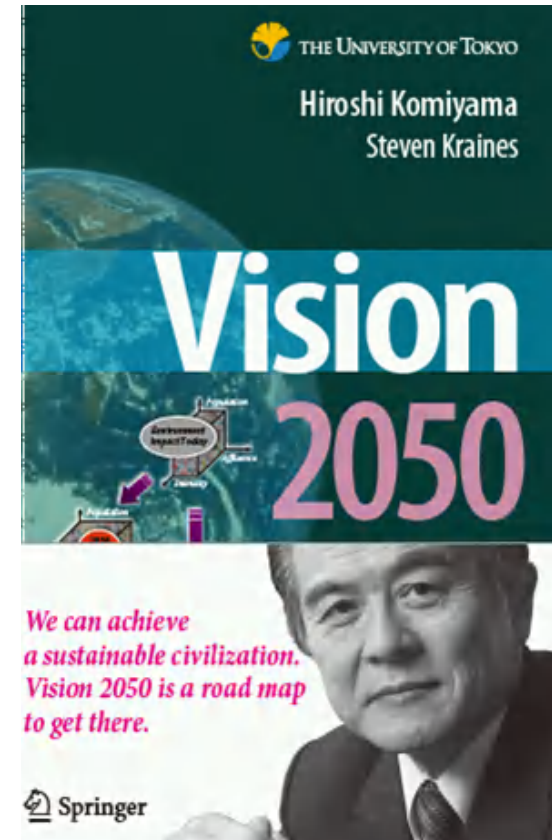
Data: from "Chikyu Jizoku no Gijutsu"

先進国と途上国の合意可能なビジョン

Energy Scenario in developed and developing countries



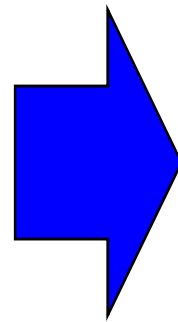
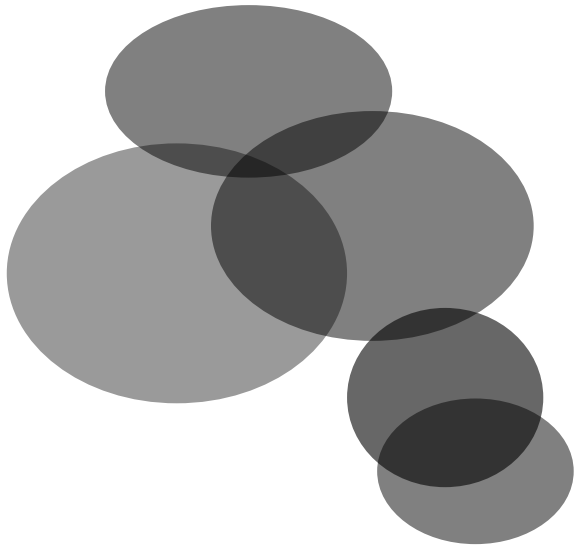
Technology for the Earth - Vision 2050 -



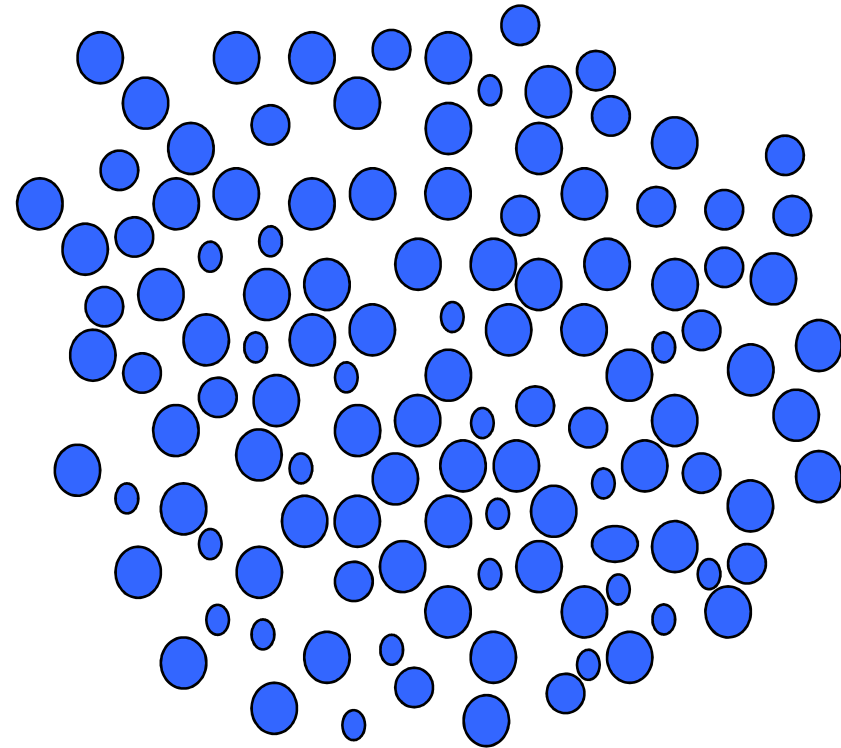
知識の爆発

Subdivision and Compartmentalization of Science

1900

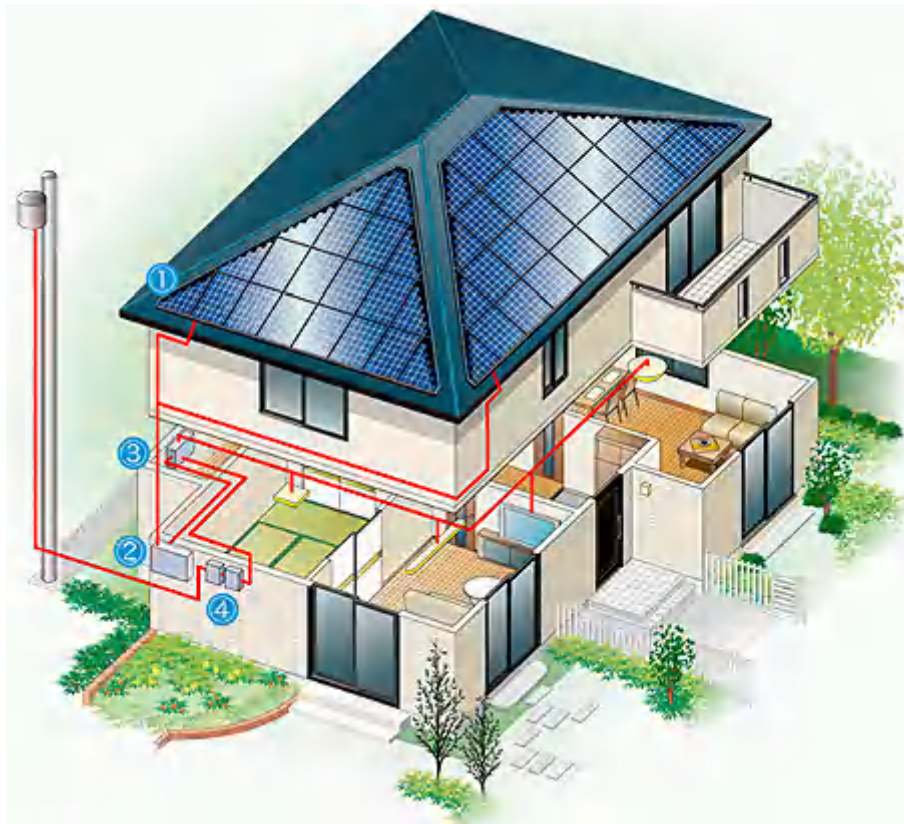


2000



小宮山エコハウス Komiyama Eco-House

Today's technologies can do!

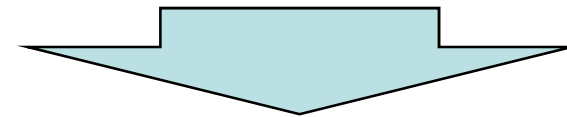


Solar Power Generation: 3.6kW

Heat Pump Water Heater: COP=4

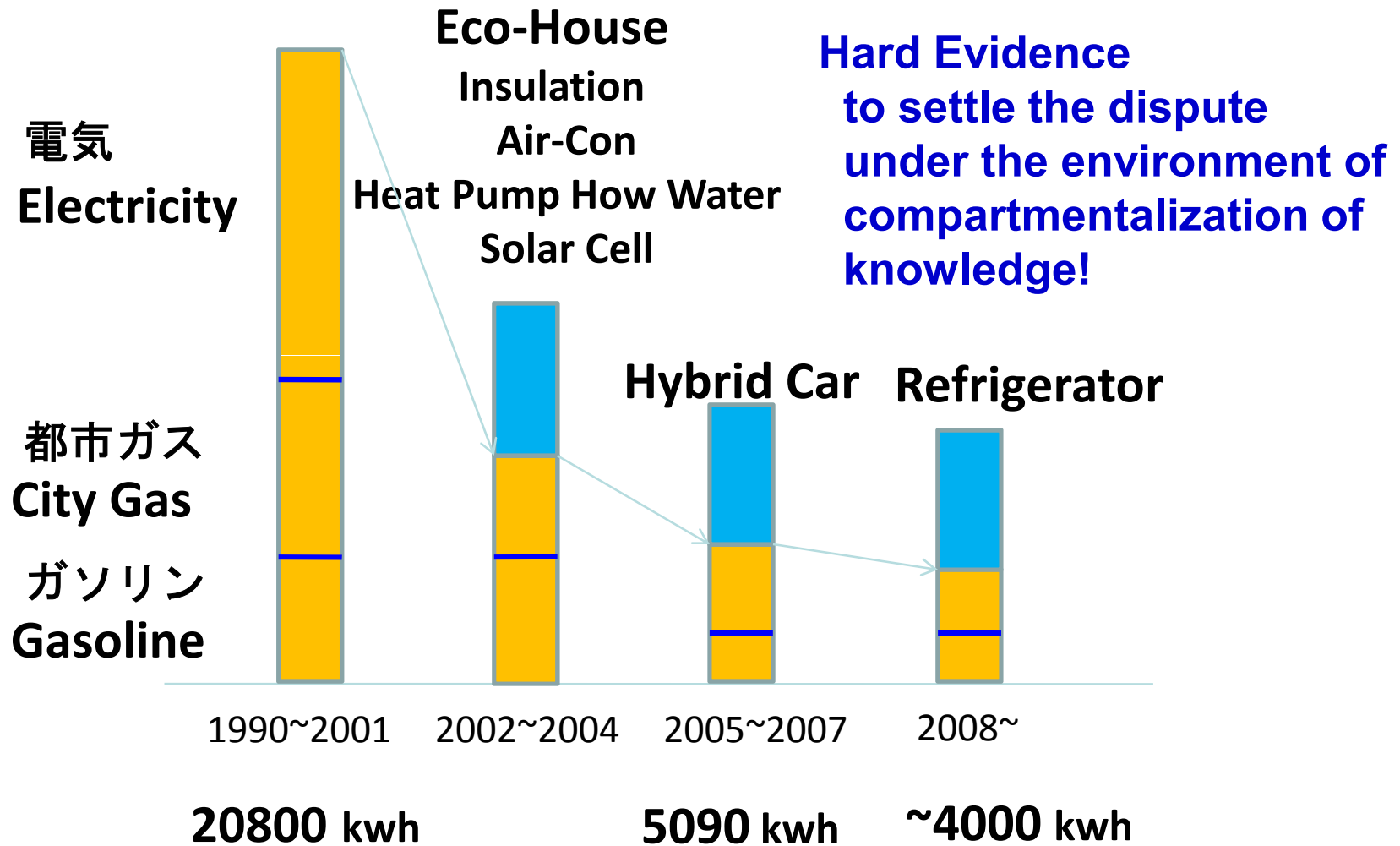
High Insulation: $K=1.6 \text{ W/m}^2\text{K}$

New air conditioners



80 % Energy Reduction

A Model for 80% Reduction of Energy Consumption for Household and Transportation



Action of a leading university

Todai Sustainable Campus Project

TSCP-2012 CO2▲15% (2006)
TSCP-2030 CO2▲50% (2006)



柏国際学術都市での社会実験

高齢化社会のビジョンづくり

駅前研究室

オンデマンドバス・自転車共用利用・

ベロタクシー実験・LRT構想

柏の葉キャンパスシティITコンソーシアム

柏ジェロントロジープロジェクト

十坪ジムプロジェクト

ほのぼのプロジェクト

ケミレスタウンプロジェクト

柏の葉診療所

柏の葉鍼灸院

柏エコ・ライフイノベーションプロジェクト

Experiments in Kashiwa Town

Creating a Vision for Aging Society

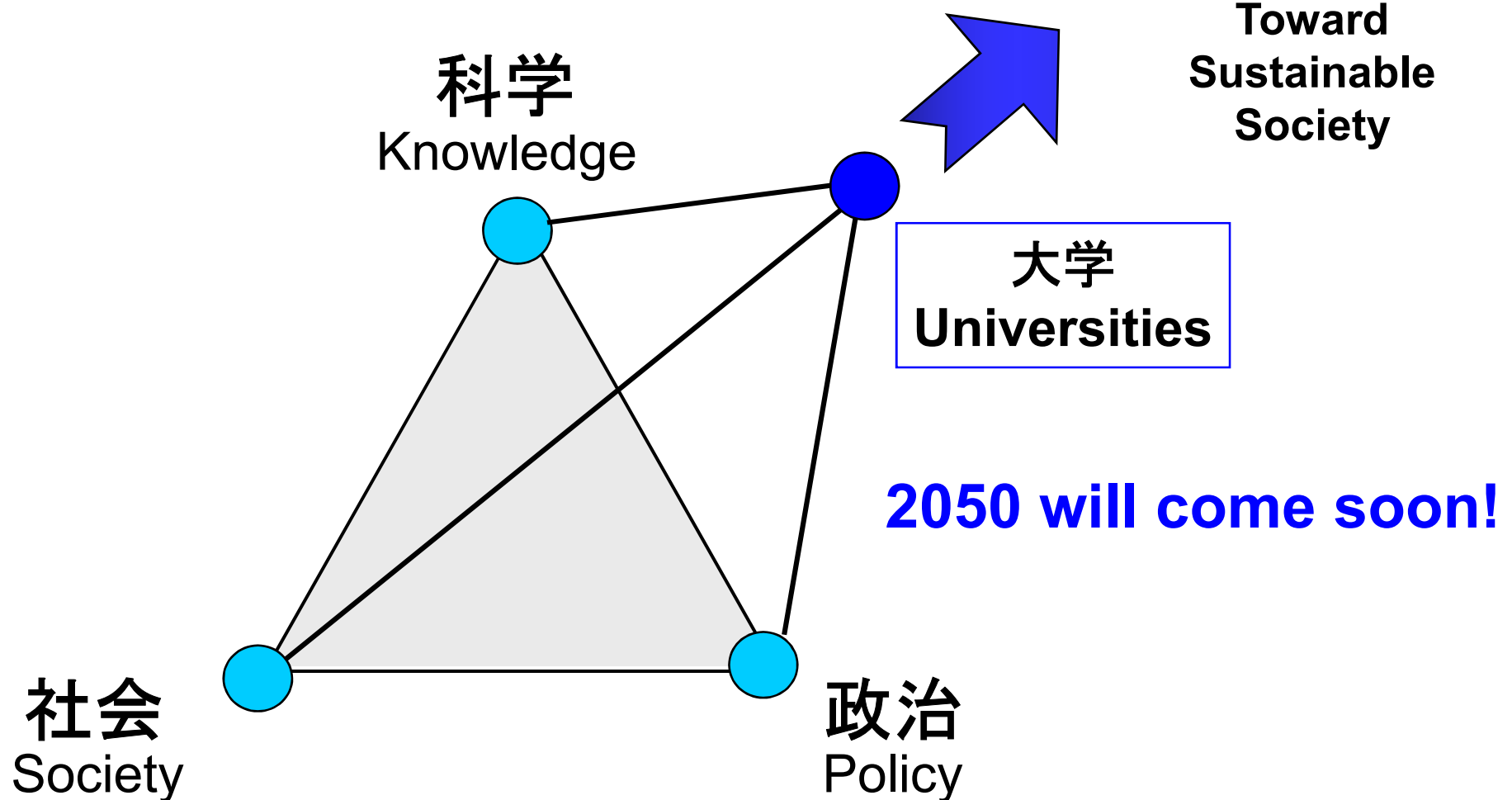
- Kashiwa-no-ha off-campus Laboratories
- On Demand Bus, Bicycle Sharing, Velotaxi, LRT Concept
- Kashiwa-no-ha Campus-city IT Consortium
- Kashiwa Gerontology Project
- Totsubo(十坪) Gym Project
- “Honobono” Project
- Chemiless Town Project
- Kashiwa-no-ha Clinic
- Kashiwa-no-ha Acupuncture Clinic
- Eco-life Innovation Project in Kashiwa

21世紀の「行動する大学」

The New Role of universities Driving Engine for Movements

持続可能社会

Toward
Sustainable
Society



Japanese experience with Sumida river

昭和42年の隅田川 1944

現在の隅田川 present



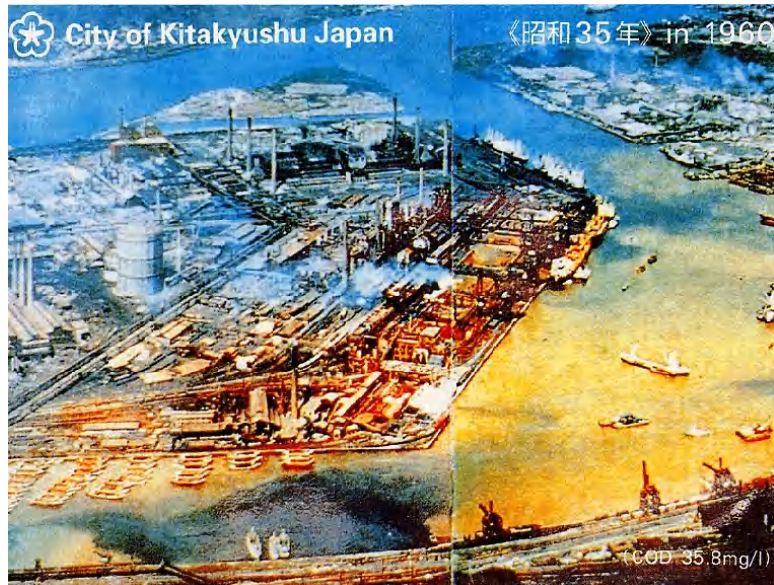
東京屋形船案内

http://www.t-yakata.com/tyh_dkship.htm

環境省 図で見る環境白書 昭和57年

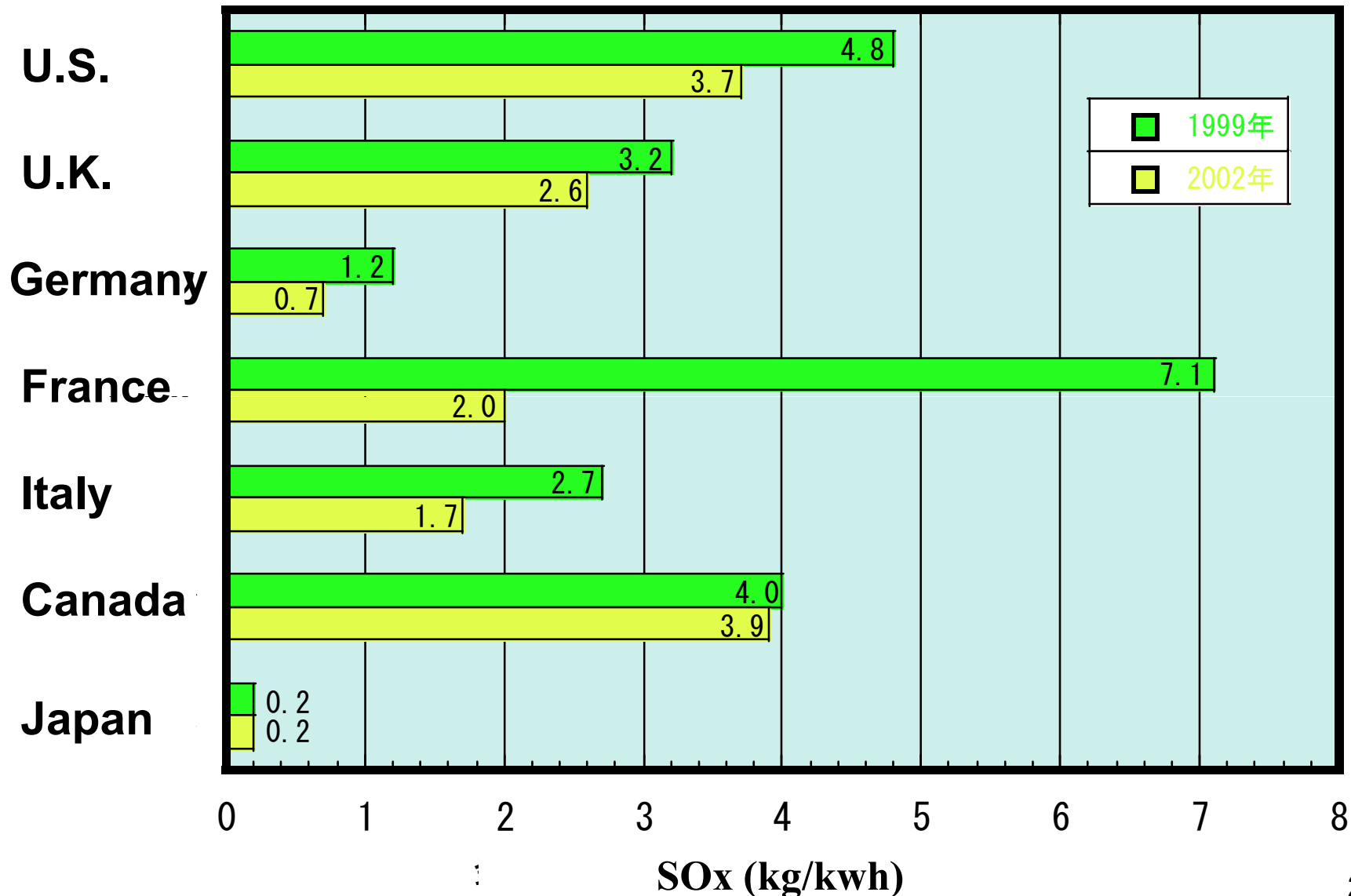
<http://www.env.go.jp/policy/hakusyo/zu/eav11/eav110000000000.html>

北九州市の公害克服 Japanese experience with kitakyusyu



火力発電所からの硫黄酸化物排出原単位の国際比較

Emission of Sulfur Oxides from Thermal Power Plants



Data Source: Tokyo Electric Power Company, web-site

Thank You!

