

# **Sustainability**

**- Explain it with your own terms**

Japan for Sustainability/ EcoNetworks

Kazunori Kobayashi

Kobayashi@econetworks.jp

# My Brief Background

- Environmental Economics & Policies (UC Berkeley)
  - Thesis: Community currency and game theory
  - Book translation “Future of Money”
- Japan for Sustainability (Communication Platform)
  - JFS Sustainability Index
  - Asia for Sustainability
- Eco Networks Co. (Sustainability Consulting Firm)
  - Consulting
    - visions/targets/strategy
    - reporting
  - Communication
    - contents
    - dialogue
    - social networking



# Japan for Sustainability - [www.japanfs.org](http://www.japanfs.org)

The screenshot shows the homepage of the Japan for Sustainability website. At the top, there is a red banner with the date "20111031 MON" and a photograph of red flowers. Below the banner, there is a navigation menu with links for "JFS Menu", "About us", "Join", "Mail Magazine", "Contact", "Manga", "Projects", and "Ecomap". A secondary menu includes social media icons for LinkedIn, Facebook, YouTube, and Twitter. The main content area features a "Technology" tag and a headline: "Fukuoka City's Landfill Technology as New Method for CDM". The article text describes a new landfill technology developed by Fukuoka City and Fukuoka University, accredited as a CDM method. To the right, there is a call to action: "Support JFS for a Sustainable Future" with links to "About JFS" and "How you can help us". Below this is a PR advertisement from supporting organizations, featuring a logo for "Eco Networks" with the text "WE ARE THE TEAM SUSTAINABILITY". A search bar is located on the right side, with a "Search" button and a link to "About Search". The "RECENT ARTICLES" section on the left lists three articles: "Major Japanese Breweries Share Logistics to Cut CO2 Emissions" (Transportation), "Nitto Denko to Co-Develop Novel Renewable Energy Powered by Osmosis" (Technology), and "Toyota to Introduce Power-Supply System to Its Hybrid Vehicles" (Energy). The "INFORMATION" section on the right mentions the launch of the "Miracle Miracle" website for children.

We share information on developments and activities originating in Japan that lead toward sustainability, with the aim of building momentum toward a sustainable path for the world.


# Network


- Subscribers from 191 countries
- Website access 100,000+, articles 2000+
- Supported by Online volunteers
- More than 700 volunteers around the world
- Diversity : vocation, age, gender, region/country
- Membership: 70 corporations/municipalities, 200 individuals


the island is urbanized), and it is famous as the home of the Japanese crested ibis, or "Toki" (in Japanese). The main industries on the island -- which has a population of approximately 65,000 -- are agriculture, forestry and fisheries, construction, and tourism.

TAG  
—  
Municipal Government , Newsletter [More](#)

RECENT ARTICLES

2010.10.18 Mon  
 **Environmental 'Green Float' Island City to Float in Equatorial Pacific Ocean** [Technology](#)  
One of the largest general contractors in Japan, Shimizu Corporation, announced on May 10, 2010, plans for promoting the research and...

2010.10.17 Sun  
 **Ito-Yokado to Expand Closed-Loop Agriculture by Seven Farm** [Food/Water](#)  
Ito-Yokado Co., a major Japanese retailer, announced on March 19, 2010, that it will establish a core business in the agricultural se...

2010.10.16 Sat  
 **Four More Global Companies Join Smart City Project** [Ecosystem](#)  
The Future Design Center Incorporated Association (FDC) in Japan announced on June 4, 2010, that four more companies are participating in...

POPULAR ARTICLES

- > Kawasaki Plant Systems Wins Build-Operate Contract for Waste Incineration & Biogas Generation Complex
- > Sandwich Chain Opens World's First Shop with Onsite Lettuce Factory
- > Sewage pipes directly connect the home and the environment
- > Compost Reduces Waste and Produces Flowers
- > Closed-loop Recycling Project of School Gym Uniforms Launched in Kyoto

KEYWORDS

- > Energy
- > Transportation
- > Material reduction
- > Global warming
- > Ecosystem
- > Food/Water
- > Chemicals
- > Eco-product/ Business
- > Technology
- > System
- > Other
- > Government
- > Local government
- > University/ Research institute
- > Manufacturing industry
- > Non-manufacturing industry
- > NGO/Citizen
- > All

RECENT ARTICLES

- > [Newsletter] Transforming Agriculture and Economy to Save the Japanese Crested Ibis: Sado Island
- > Environmental 'Green Float' Island City to Float in Equatorial Pacific Ocean
- > Ito-Yokado to Expand Closed-Loop Agriculture by Seven Farm
- > Four More Global Companies Join Smart City Project
- > City of Kyoto Shifting from 'Car-Centric' into Being a 'Walking City'

MENU

- > About us
- > Join
- > Mail Magazine
- > Contact

# Activities

1. Provides a variety of information on the environment and sustainability, from Japan to the world, via our web site and e-mail magazines.
2. Covers not only current developments but also traditional wisdom, craftsmanship and practices of day-to-day life, as well as local activities.
3. Works to develop special partnerships with people in Asia, in order to cooperate to find paths toward sustainability in this region.
4. Welcomes feedback and comments from overseas and shares them in Japan and with partners in Asia, so that we can improve efforts and activities in this region by learning from each other.
5. **Creates a vision for a sustainable Japan through discussion among various stakeholders.**

# Goal

Imagine that we are holding “World Summit on Sustainable Development” in this room.

You should be able to present the followings;

- what is sustainability (with your own terms)
- what is your vision/indicators/policies for sustainability (with your own logic)

# Plan

10/31

- Session 1. - What is sustainability?
- countries and int'l communities
  - measurement and tracking

- Session 2. - vision
- indicators and policy => Workshop

11/7

- Session 1. - Group work & Presentation

- Session 2. - Discussion
- Latest policy framework

# Session 1

- Communication exercise

1) What is Sustainability?

(Background and Definitions)

2) How are we responding?

(National/International strategies and indicators)

3) How do we measure and track it?



# Communication First

- Why communication first?
- As ...
  - An Engineer
    - Research Proposal / Budget
  - A Policy Maker
    - Different countries and interests
  - A Business Person
    - 80-90% of the time

# Communication Exercise

## “Date Game”

|   |  |
|---|--|
| Your name/<br>country/<br>home town             | Research interest                                  |
| Your “personal”<br>eco/sustainability<br>policy | What you would<br>write about on JFS<br>newsletter |

Prep: 5 minutes

Communicate: 15 minutes

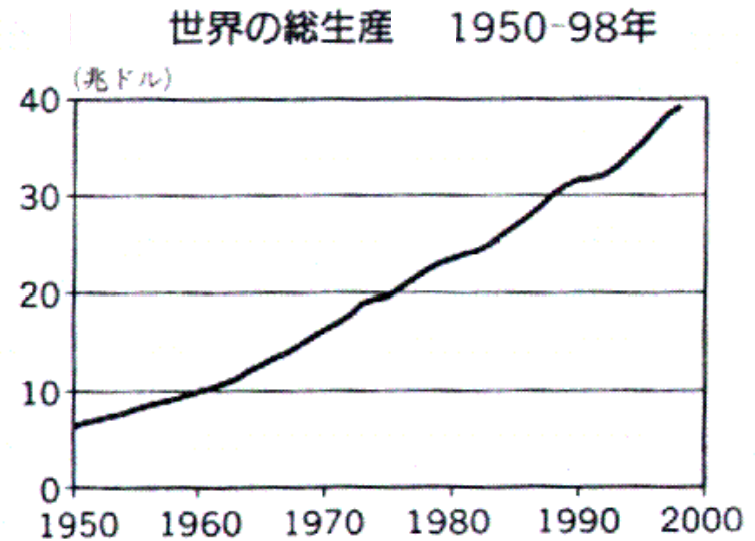
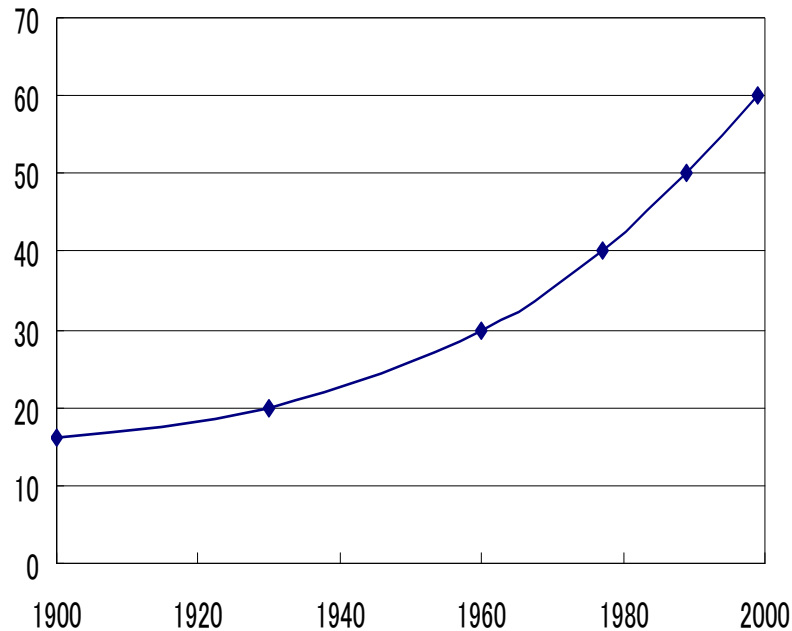
1) What is sustainability?  
(Background and definitions)

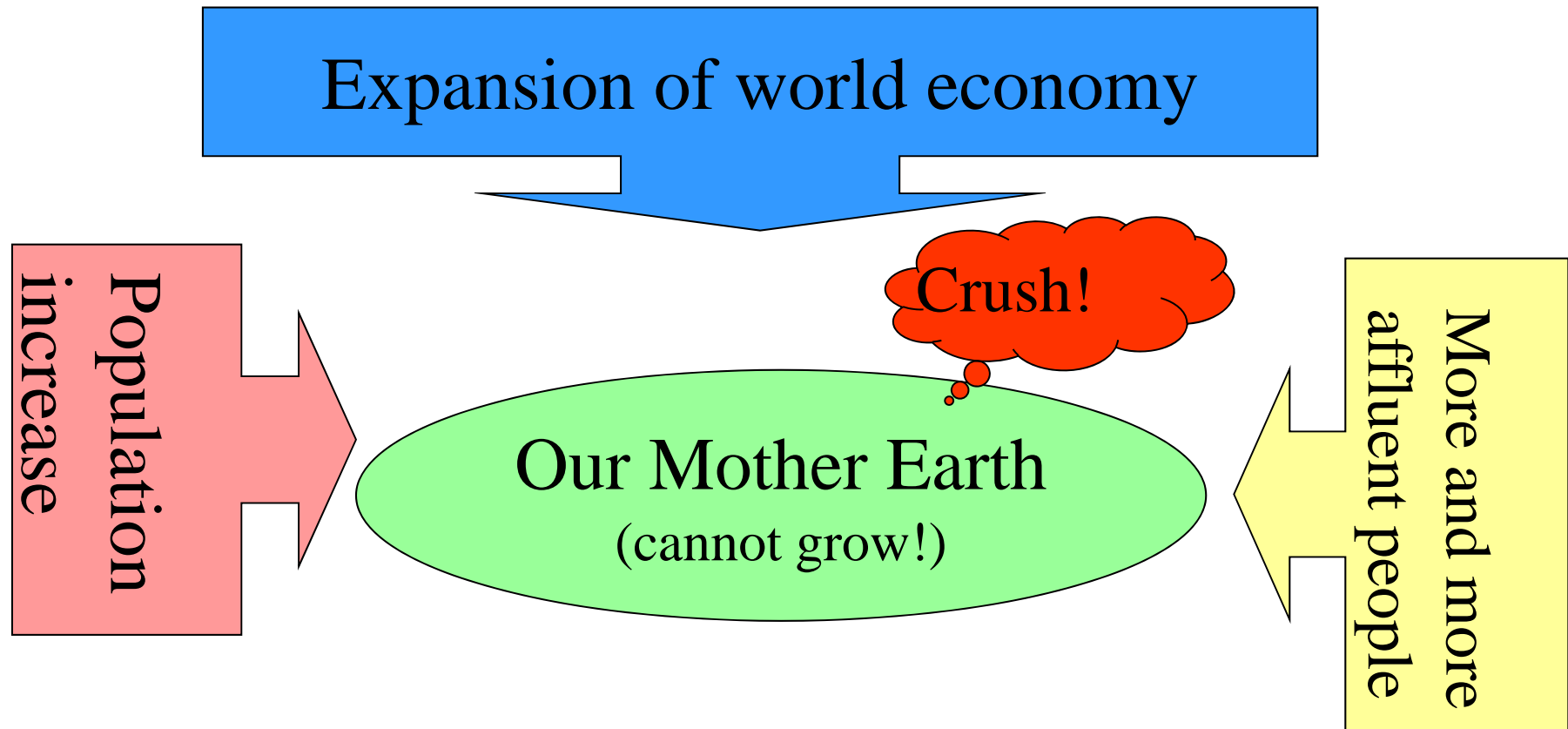
# Background: Root causes of global environmental crisis

Population



World Economy





$$\text{Impact} = \text{Population} \times \text{Affluence} \times \text{Technology}$$

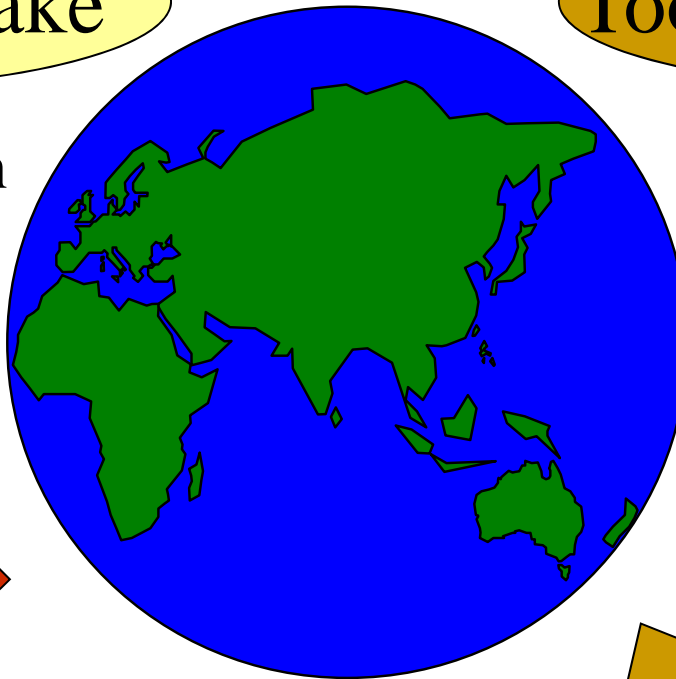
# Root causes are...

## Too much intake

- Resource depletion
- Lowing aquifers
- Shrinking forests

## Too much emission

- CO<sub>2</sub>/ GHGs
- Wastes
- Toxic Substances
- NO<sub>x</sub>, SO<sub>x</sub>...



“If everyone lived as we do in the UK we’d need three planets to support us.”

# What is Sustainability?

## **Webster's New International Dictionary**

"Sustain - to cause to continue (as in existence or a certain state, or in force or intensity); to keep up, especially without interruption diminution, flagging, etc.; to prolong."

*Webster's New International Dictionary.*

(Springfield, Mass.: Merriam-Webster Inc., 1986)

# What is Sustainability?

## **Our Common Future**

"Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs."

*Page 8, World Commission on Environment and Development. Our Common Future. (Oxford, Great Britain: Oxford University Press, 1987). (Frequently referred to as the Brundtland report after Gro Harlem Brundtland, Chairman of the Commission)*



# What is Sustainability?

## **World Business Council on Sustainable Development**

"Sustainable development involves the simultaneous pursuit of economic prosperity, environmental quality and social equity. Companies aiming for sustainability need to perform not against a single, financial bottom line but against the triple bottom line."

# What is Sustainability?

## **World Business Council on Sustainable Development (cont.)**

"Over time, human and social values change. Concepts that once seemed extraordinary (e.g. emancipating slaves, enfranchising women) are now taken for granted. New concepts (e.g. responsible consumerism, environmental justice, intra- and inter-generational equity) are now coming up the curve."

<http://www.wbcasd.ch/>

# What is Sustainability?

## **Interfaith Center on Corporate Responsibility (ICCR)**

"Sustainable development...[is] the process of building equitable, productive and participatory structures to increase the economic empowerment of communities and their surrounding regions.

**Interfaith Center on Corporate Responsibility**

# What is Sustainability?

**Jerry Sturmer**

**Santa Barbara South Coast Community  
Indicators**

“Sustainability is meeting the needs of all humans, being able to do so on a finite planet for generations to come while ensuring some degree of openness and flexibility to adapt to changing circumstances.”

[JSturmer@aol.com](mailto:JSturmer@aol.com)

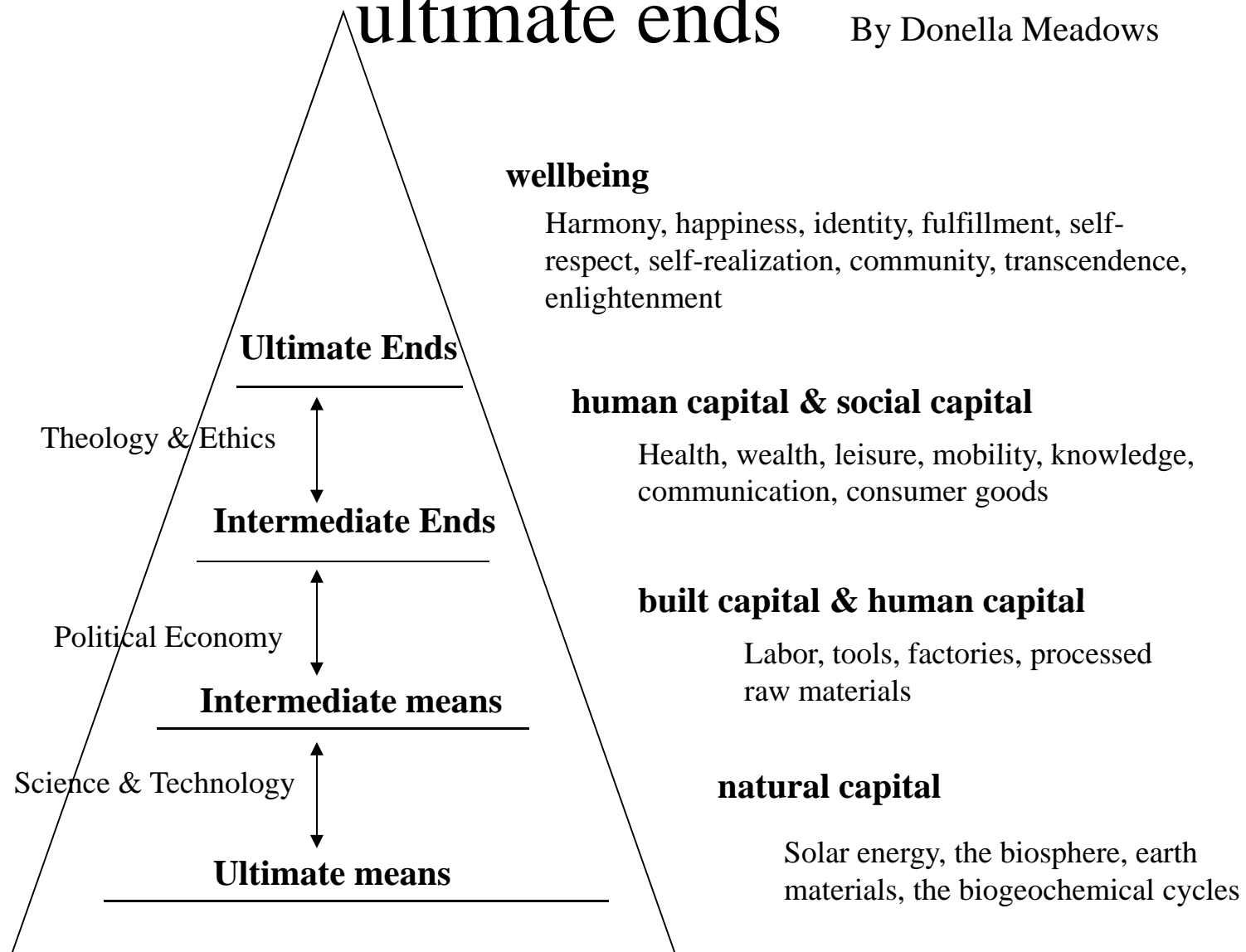
# What is Sustainability?

## **The Native American Iroquois Confederacy**

"seventh generation" philosophy mandating that chiefs always consider the effects of their actions on their descendants through the seventh generation in the future.

# Hierarchy from ultimate means to ultimate ends

By Donella Meadows



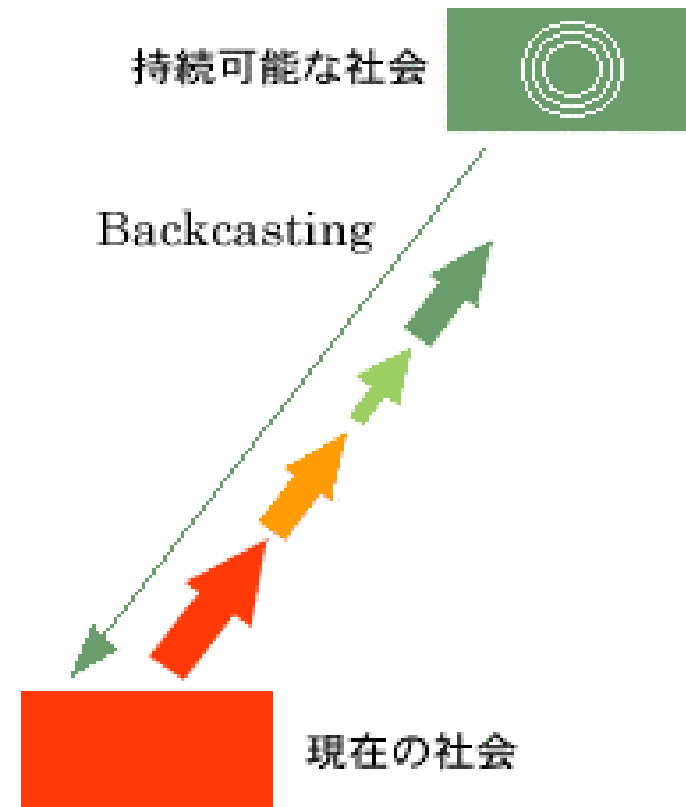
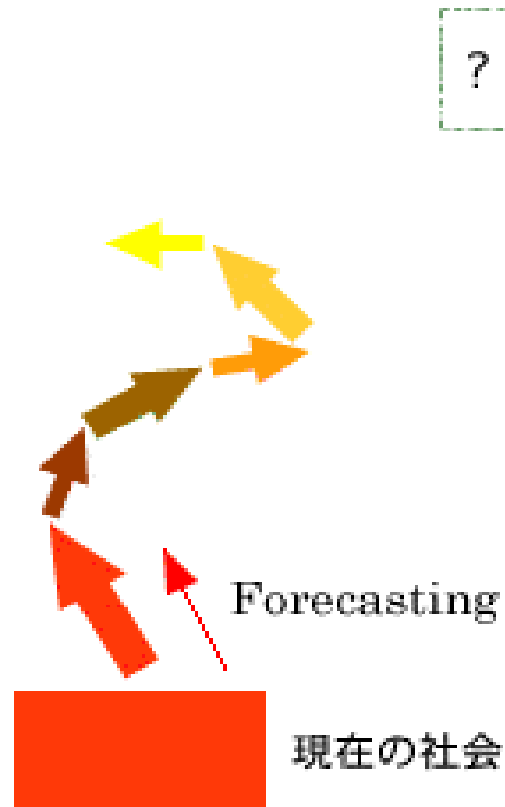
Source: <http://www.sustainabilityinstitute.org/pubs/Indicators&Information.pdf>

# Now what?

## Vision and Backcasting

フォアキャスティング手法

バックキャスティング手法



# Copenhagen Accord (2009/12)

- not legally binding
- agrees cooperation in peaking (stopping from rising) global and national greenhouse gas emissions "as soon as possible" and that "a low-emission development strategy is indispensable to sustainable development"

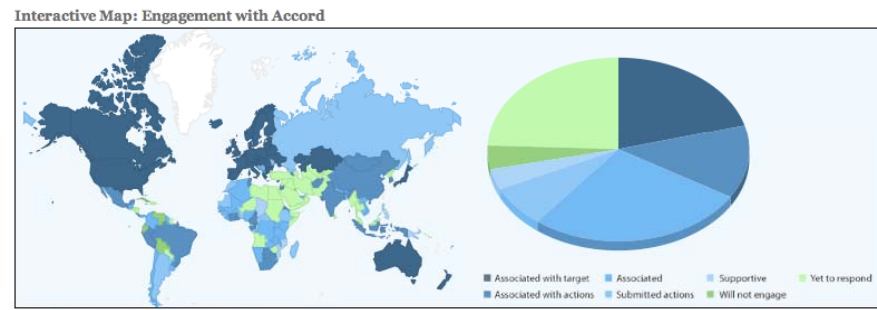




# Different responsibilities

## Developed Countries:

























- "commit to economy-wide emissions targets for 2020"
- raise funds of \$30 billion from 2010-2012 of new and additional resources



## Developing Countries:

- "implement mitigation actions" (Nationally Appropriate Mitigation Actions) to slow growth in their carbon emissions
- report those actions once every two years
- specially these with low-emitting economies should be provided incentives to continue to develop on a low-emission pathway

## Examples of “commitment”

|   | Country                | Date       | Reported Statements   | Engagement with Accord  | Reduction by 2020    | Reduction Base Year | Reduction Type  | On 1990 Scale (+/-)              | Share of World's Total GHGs <sup>1</sup> | CO <sub>2</sub> Emissions per capita (tCO <sub>2</sub> eq) <sup>1</sup> | Source  |
|---|------------------------|------------|---|-------------------------|----------------------|---------------------|---|----------------------------------|--|---|---|
|    | China                  | 1/29 2010  | nationally appropriate mitigation actions and a <a href="#">letter</a> indicating association. Also submitted <a href="#">additional information</a> saying "China highly commends and supports the Copenhagen Accord." <a href="#">Read more</a> | Associated with actions | <b>40 to 45%</b>     | N/A                 |    | <b>See Note<sup>9</sup></b>      | <b>16.64%</b>                            | <b>5.5</b>  | <br>UNFCCC   |
|    | United States          | 1/28 2010  | Formally submitted letter to the United Nations indicating association and submitted an economy-wide emissions reduction target. <a href="#">Read more</a>  | Associated with target  | <b>17%</b>           | 2005                |    | <b>-3.67%<sup>8</sup></b>        | <b>15.78%</b>                            | <b>23.1</b>   | <br>UNFCCC   |
|    | European Union (EU-27) | 1/27 2010  | Formally submitted letter to the United Nations indicating association and submitted an economy-wide emissions reduction target. <a href="#">Read more</a>  | Associated with target  | <b>20% / 30%</b>     | 1990                |    | <b>-20% / -30%</b>               | <b>11.69%</b>                            | <b>10.3</b>   | <br>UNFCCC   |
|    | Brazil                 | 12/29 2009 | Formally submitted <a href="#">letter</a> to the United Nations indicating association and submitted nationally appropriate mitigation actions. <a href="#">Read more</a>   | Associated with actions | <b>36.1 to 38.9%</b> | N/A                 |    | <b>+6.4 to +1.7%<sup>2</sup></b> | <b>6.6%</b>                              | <b>15.3</b>   | <br>UNFCCC   |
|   | Russian Federation     | 2/1 2010   | Submitted an economy-wide emissions reduction target. <a href="#">Read more</a>   | Submitted target        | <b>15 to 25%</b>     | 1990                |   | <b>-15 to -25%</b>               | <b>4.64%</b>                             | <b>14.0</b>   | <br>UNFCCC   |
|  | India                  | 1/29 2010  | Formally submitted <a href="#">letter</a> to the United Nations indicating association and submitted nationally appropriate mitigation actions. <a href="#">Read more</a>   | Associated with actions | <b>20% to 25%</b>    | 2005                |  | <b>See Note<sup>10</sup></b>     | <b>4.32%</b>                             | <b>1.7</b>  | <br>UNFCCC |
|  | Japan                  | 1/26 2010  | Formally submitted letter to the United Nations indicating association and submitted an economy-wide emissions reduction target. <a href="#">Read more</a>  | Associated with target  | <b>25%</b>           | 1990                |  | <b>-25%</b>                      | <b>3.14%</b>                             | <b>10.6</b>   | <br>UNFCCC |
|  | Maldives               | 1/29 2010  | Formally submitted <a href="#">letter</a> to the United Nations indicating association and submitted nationally appropriate mitigation actions. <a href="#">Read more</a>   | Associated with actions | <b>100%</b>          | 2009                |  | <b>-100%</b>                     | <b>0.00%</b>                             | <b>2.5</b>  | <br>UNFCCC |

# Strategies for sustainability?

| NO. | 事例                 | 国名      | 概要  |
|-----|--------------------|---------|---|
| 1   | 持続可能な開発指標          | イギリス    | 15のヘッドライン指標の最新データをグラフでわかりやすく表示。2008年の更新では20主要指標に拡充。                   |
| 2   | 国家持続性戦略            | ドイツ     | 「世代間の公平性」「生活の質」「社会的まとまり」の3分野で21の数値目標を設定                               |
| 3   | 持続可能な開発指標          | スウェーデン  | 「持続可能なコミュニティ」「平等の健康」「人口問題への対応」「持続可能な成長」の4つの戦略のもと、12のヘッドライン指標、99の指標を設定 |
| 4   | 持続可能な開発のモニタリングシステム | スイス     | 持続可能な開発に関する社会、経済、環境のデータベース。<br>※ドイツ語、フランス語のみ                          |
| 5   | 持続可能な開発指標          | フィンランド  | 「世代間の公平性」「世界的責任」など8つのカテゴリで64の指標を設定。毎年更新されている。                         |
| 6   | 国家持続可能な開発戦略        | デンマーク   | 主要な指標として、8つの基本原則のもと、14の指標を設定。その他、気候変動、生態系保全などの各分野で指標を設けている。           |
| 7   | 環境と持続可能な開発指標       | カナダ     | 自然資本を中心とした6つの指標(大気環境、水環境、温室効果ガス、森林被覆、湿地、学業成績)を設定。                     |
| 8   | 持続性指標              | オーストラリア | 持続可能な開発の国家戦略として、24の指標を設定。   |
| 9   | 国家持続可能な開発戦略        | オーストリア  | 20の基本方針のもと、48の指標が定められている。※ドイツ語  |
| 10  | 持続可能な開発指標          | アメリカ合衆国 | 社会、経済、環境にわけ、それぞれ「長期的な資源と負債」「経過」「現状の結果」の3種類で計39の指標を設定                  |
| 11  | 持続可能な開発全国指標        | フランス    | ※フランス語のみ  |

詳細:国等が作成する持続可能性指標 <http://www.nies.go.jp/sdi-db/reference.php>

# UK headline indicators

## H1 ECONOMIC OUTPUT

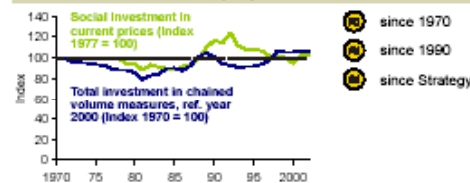
### GDP per head (UK)



- 27% increase in real GDP per head between 1990 and 2002 2.0% per year on average.
- Real GDP per head increased by 1.4% in 2002, and has increased by 9% since 1998.

## H2 INVESTMENT

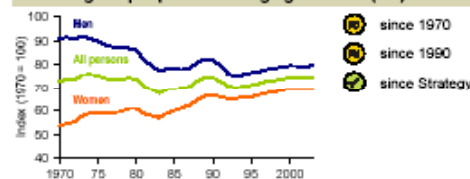
### Total & Social Investment (UK)



- Total real investment relative to GDP rose from 16.3% in 1990 to 17.2% in 1998, and was 17.2% in 2002.
- Social investment (railways, hospitals, schools etc.) was around 2% of GDP in 1990 and 1.7% in 2002 (only available on a current price basis).

## H3 EMPLOYMENT

### Percentage of people of working age in work (UK)



- The percentage of working age people in work was 74.7% in 2003 – the same as in 1990.
- The percentage for 2003 was 0.3 percentage points up on 2002 and was an increase on the 1999 figure of 73.9%.

## H4 POVERTY AND SOCIAL EXCLUSION

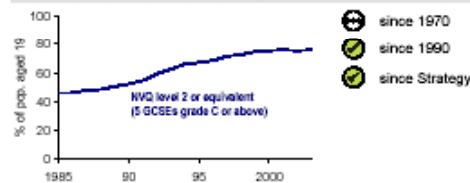
### Selected indicators of poverty & social exclusion



- 11.5% of working age people were in workless households in 2003, reduced from 12.8% in 1998; 14.8% were without qualifications, down from 16.7 in 1999.
- 28% of children were in relatively low-income households (after housing costs) in 2002-3, reduced from 34% in 1996-7.
- 28% of single elderly households experienced fuel poverty in 2001, reduced from 77% in 1991 and 61% in 1996.

## H5 EDUCATION

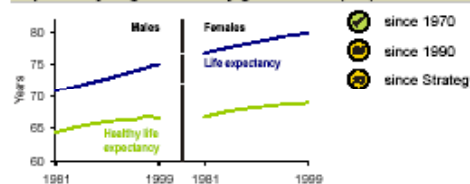
### Level 2 qualifications at age 19 (UK)



- In 2003, 76.1% of 19 year-olds achieved NVQ level 2 or equivalent (5 GCSEs grade C), up from 52% in 1990, and 74.5% in 1999. The 2003 figure was the same as that for 2001 (the previous highest level).

## H6 HEALTH

### Expectancy of good or fairly good health (GB)



- Between 1990 and 1999 healthy life expectancy increased only slightly, from 66.1 to 66.6 years for men and from 68.3 to 68.9 years for women.
- Overall life expectancy (75.1 years for men, 80.0 years for women) has increased more than healthy life expectancy, so an increasing proportion of those extra years are in poor health.

## H7 HOUSING CONDITIONS

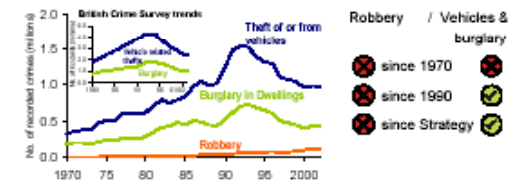
### Households in non-decent housing (England)



- Between 1996 and 2001, non-decent housing fell from 52% to 38% and from 45% to 32% in the social and private sectors, respectively.
- Between 1991 and 1996 there was no significant change across a broad range of condition measures. As housing conditions have changed for the better since 1996, the overall assessment is that there has been an improvement since 1990.

## H8 CRIME

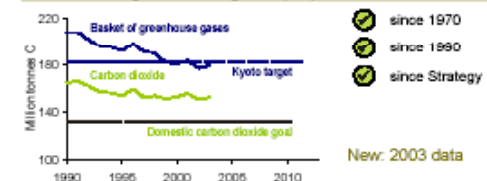
### Recorded crime (England & Wales)



- Both the British Crime Survey and recorded crime show that burglary and vehicle crimes fell substantially from the early 1990s: from 1990 such recorded crimes fell by 17% and 23% respectively (BCS indicates falls from 1991 of 29% and 38%).
- By 2002-3, recorded robbery had risen to 108,000 from 67,000 in 1998-9 but was 11% lower than the previous year.

## H9 CLIMATE CHANGE

### Emissions of greenhouse gases (UK)



- Emissions of the 'basket' of six greenhouse gases (on which progress is assessed) fell by 12% between 1990 and 2001, and provisionally by 14% between 1990 & 2003.
- CO<sub>2</sub> emissions for 2003 were provisionally 7% lower than in 1990 but rose by about 1.5% between 2002 and 2003.

## H10 AIR QUALITY

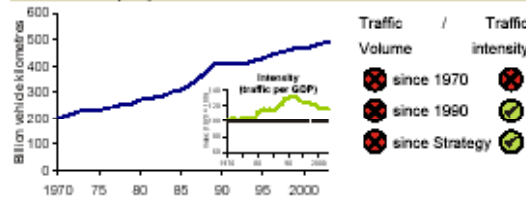
Days when pollution is moderate or higher (UK)



- Owing to an unusually hot summer 50 days in 2003 had moderate or higher air pollution on average at urban sites – down from 59 days in 1993 but up from 20 days in 2002.
- Rural air quality was relatively poor for 61 days in 2003 compared with 50 in 1990, but is highly dependent on the weather and there is no clear overall trend.

## H11 ROAD TRAFFIC

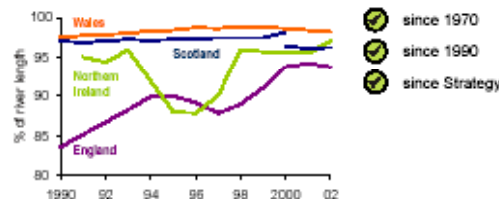
Road traffic (GB)



- Between 1990 and 2003, road traffic volume increased by 20% from 411 to (provisionally) 493 billion vehicle kilometres.
- Road traffic intensity (vehicle kilometres per GDP) fell by 11% between 1990 and 2003. This shows that, whilst traffic volumes have continued to rise, the historical link between road traffic and economic growth is weakening.

## H12 RIVER WATER QUALITY

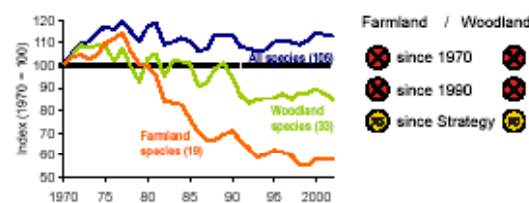
Rivers of good or fair chemical quality (UK)



- In 2002 94% of UK river lengths were of good or fair chemical quality. A similar proportion were of good or fair biological quality (not shown), with 68% of good quality.
- There have been significant improvements in English rivers for both chemical and biological quality.

## H13 WILDLIFE

Populations of wild birds (UK)



- The index of farmland bird populations has nearly halved since its 1977 peak and has fallen by 18% since 1990, but has remained at about the same level over the last four years.
- The woodland bird index fell by 29% between its 1974 peak & 1998 since when it has remained roughly constant.

## H14 LAND USE

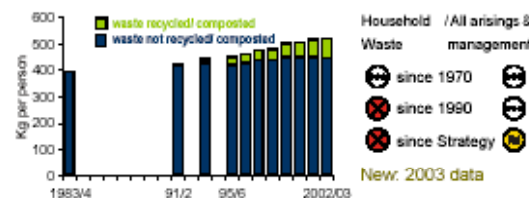
Homes built on previously developed land (England)



- In 2003, 66% of new dwellings were provided on previously developed land and through conversions, up from around 54% in the early 1990s.

## H15 WASTE

Household waste (England & Wales)



- Household waste is about a sixth of all controlled waste. Between 1991-2 and 2002-3, the amount not recycled or composted increased by 7% from 417 to 446 kg per person. However, the percentage recycled or composted increased from 3% to 14% in the same period and in 2002-3 the amount not recycled fell for the first time in recent years.
- In 1998-9 UK households, commerce and industry produced about 195 million tonnes of waste (not shown). About 50% of this went to landfill. Estimated figures for 2000-1 suggest the total amount of waste was 220 million tonnes, with 45% going to landfill. (These changes are not statistically significant.)

## Quality of Life Barometer

Updated June 2004



SUSTAINABLE DEVELOPMENT

Sustainable development is about ensuring a better quality of life for everyone, now and for generations to come.

The 15 Headline indicators of sustainable development – a quality of life barometer – provide an overview of progress in meeting the objectives of the UK Sustainable Development Strategy - *A better quality of life* (May 1999).

Headline indicators – assessment of progress

|  | since 1990 | since Strategy |
|--|------------|----------------|
| Economic output  | ⊗          | ⊗              |
| Investment   | ⊗          | ⊗              |
| Employment   | ⊗          | ⊗              |
| Poverty & social exclusion                                   | ⊗          | ⊗              |
| Education  | ⊗          | ⊗              |
| Health   | ⊗          | ⊗              |
| Housing - conditions   | ⊗          | ⊗              |
| Crime - robbery  | ⊗          | ⊗              |
| - vehicle & burglary   | ⊗          | ⊗              |
| Climate change   | ⊗          | ⊗              |
| Air quality  | ⊗          | ⊗              |
| Road traffic - total traffic volumes                         | ⊗          | ⊗              |
| - traffic per GDP  | ⊗          | ⊗              |
| River water quality  | ⊗          | ⊗              |
| Wildlife - farmland birds                                    | ⊗          | ⊗              |
| - woodland birds   | ⊗          | ⊗              |
| Land use   | ⊗          | ⊗              |
| Waste - household waste                                      | ⊗          | ⊗              |
| - all arisings & management                                  | ⊗          | ⊗              |
| Key:   |            |                |
| Significant change, in direction of meeting objective        | ⊗          | ⊗              |
| No significant change  | ⊗          | ⊗              |
| Significant change, in direction away from meeting objective | ⊗          | ⊗              |
| Insufficient or no comparable data                           | ⊗          | ⊗              |

Where a trend is unacceptable, the government will adjust its policies, and look to others to join it in taking action. A full assessment of progress can be found in the fourth Government Annual Report on Sustainable Development 2003: *Achieving a better quality of life*. Data and further details on the Headline and a wider core set of indicators are available on the website below.

[www.sustainable-development.gov.uk](http://www.sustainable-development.gov.uk)

For additional copies of this leaflet, please call 020 7082 8621

# Measuring progress 2010

## Key indicators

The twenty key indicators in the table below are selected to provide an overview of some of the important goals for sustainable development.

| Indicator number and title              | Change since 1990 <sup>1</sup> | Change since 2003 | Direction in latest year* |
|---|--------------------------------|-------------------|---------------------------|
| 1. Greenhouse gas emissions             | ✓                              | ✓                 | ✓                         |
| 13. Resource use                        | ✓                              | ✓                 | ✓                         |
| 18. Waste arisings                      | ⊖                              | ✓                 | ✓                         |
| 20. Bird populations                    | Farmland                       | ✗                 | ✓                         |
|   | Woodland                       | ⊖                 | ✓                         |
|   | Seabird                        | ⊖                 | ≈                         |
| 27. Fish stocks sustainability          | ✓                              | ✓                 | ✓                         |
| 28. Ecological impacts of air pollution | Acidity                        | ⊖                 | ...                       |
|   | Nitrogen                       | ⊖                 | ...                       |
| 30. River quality                       | Biological                     | ⊖                 | ≈                         |
|   | Chemical                       | ✓                 | ✓                         |
| 32. Economic output                     | ✓                              | ✓                 | ✗                         |
| 37. Active community participation      | ⊖                              | ✗                 | ✗                         |
| 38. Crime                               | ✓<br><small>1991</small>       | ✓                 | ✓                         |
| 40. Employment                          | ⊖                              | ⊖                 | ✗                         |
| 41. Workless households                 | ⊖                              | ⊖                 | ✗                         |
| 43. Childhood poverty                   | Before housing cost            | ✓                 | ⊖                         |
|   | After housing cost             | ⊖                 | ⊖                         |
| 45. Pensioner poverty                   | Before housing cost            | ✓                 | ⊖                         |
|   | After housing cost             | ✓                 | ✓                         |

<sup>1</sup> Year as shown if not 1990

| Indicator number and title | Change since 1990 <sup>1</sup>                | Change since 2003 <sup>2</sup> | Direction in latest year* |
|----------------------------|---|--------------------------------|---------------------------|
| 47. Educational attainment | ✓   | ✓<br><small>2004</small>       | ✓                         |
| 49. Health inequality      | Infant mortality gap<br><small>1994</small>   | ✗                              | ✓                         |
|                            | Life expectancy gap<br><small>1991</small>    | ✗                              | ✗                         |
| 55. Mobility               | Walking / cycling<br><small>1995-7</small>    | ✗                              | ✓                         |
|                            | Public transport use<br><small>1995-7</small> | ✓                              | ≈                         |
| 59. Social justice         | ⊖   | ⊖                              | ⊖                         |
| 60. Environmental equality | ⊖   | ⊖                              | ⊖                         |
| 68. Wellbeing              | ⊖   | ⊖                              | ⊖                         |









<sup>1</sup> Year as shown if not 1990    <sup>2</sup> Year as shown if not 2003

- ✓ = clear improvement since base year
- ⊖ = little or no change since base year
- ✗ = clear deterioration since base year
- ⊖ = insufficient or no comparable data

\*The third column, *Direction of change in latest year* (comparing the latest and penultimate years for which data are available) is provided to give an indication only and may not represent a clear improvement or deterioration. Indication of change is based on a 1 per cent threshold over which change in the indicator value was deemed to warrant a tick or cross. Exceptions are where recent figures are known not to represent a genuine change owing to methodological issues.

# Germany

## Our Strategy for Sustainable Development

| No.                              | Indicator areas<br>Sustainability axiom   | Indicators  | Goals   | Status   |
|----------------------------------|---|---|---|--|
| <b>I. Intergeneration equity</b> |   |   |   |  |
| 1a                               | <b>Resource protection</b><br><i>Using resources economically and efficiently</i>         | Energy productivity   | Doubling between 1990 and 2020  |   |
| 1b                               |   | Raw material productivity   | Doubling between 1994 and 2020  |   |
| 2                                | <b>Climate protection</b><br><i>Reducing greenhouse gases</i>                             | Greenhouse gas emissions  | Reduction of 21 % compared to 1990 until 2008/2012  |   |
| 3a                               | <b>Renewable energies</b><br><i>Strengthening a sustainable energy supply</i>             | Share of renewable energy sources in total primary energy consumption | Increase to 4.2 % by 2010 and to 10 % by 2020   |   |
| 3b                               |   | Share of renewable energy sources in electricity consumption          | Increase to 12.5 % by 2010 and to at least 30 % by 2020   |   |
| 4                                | <b>Land use</b><br><i>Sustainable land use</i>  | Increase in land use for housing and transport                        | Reduction in daily increase to 30 hectares by 2020  |   |
| 5                                | <b>Species diversity</b><br><i>Conserving species – protecting habitats</i>               | Species diversity and landscape quality                               | Increase to the index value 100 by 2015   |   |
| 6                                | <b>National debt</b><br><i>Consolidating the budget – creating intergeneration equity</i> | National deficit  | Structurally balanced public spending; Federal budget without net borrowing from 2011 at latest |  |



The target value of the indicator has been achieved or the remaining 'distance' would be covered by the target year (deviation less than 5 %).



The indicator is developing in the right direction, but if the annual trend continues unaltered there will still be a gap of between 5 and 20 % which will need to be covered to reach the target value in the target year.



The indicator is developing in the right direction, but if the annual trend continues unaltered there will still be a gap of more than 20 % which will need to be covered to reach the target value in the target year.

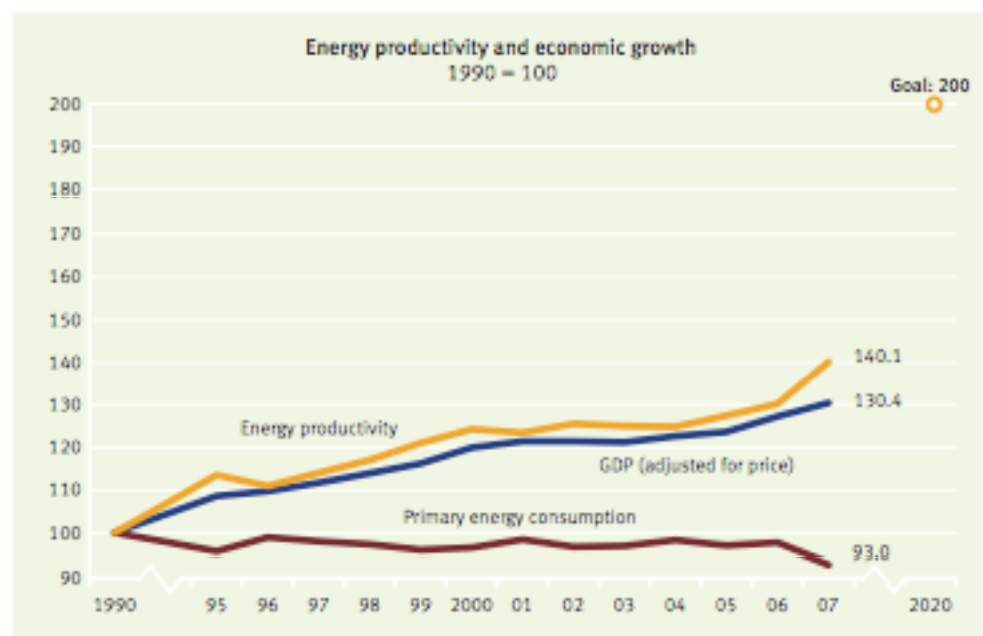


The indicator has developed in the wrong direction and if the annual trend continues unaltered the distance to be covered to reach the goal would become even greater.

## I. Intergeneration equity

### Resource Protection

*Using resources economically and efficiently*



Source: Federal Statistical Office, Working Group on Energy Balances (AGEB)

#### 1a Energy productivity

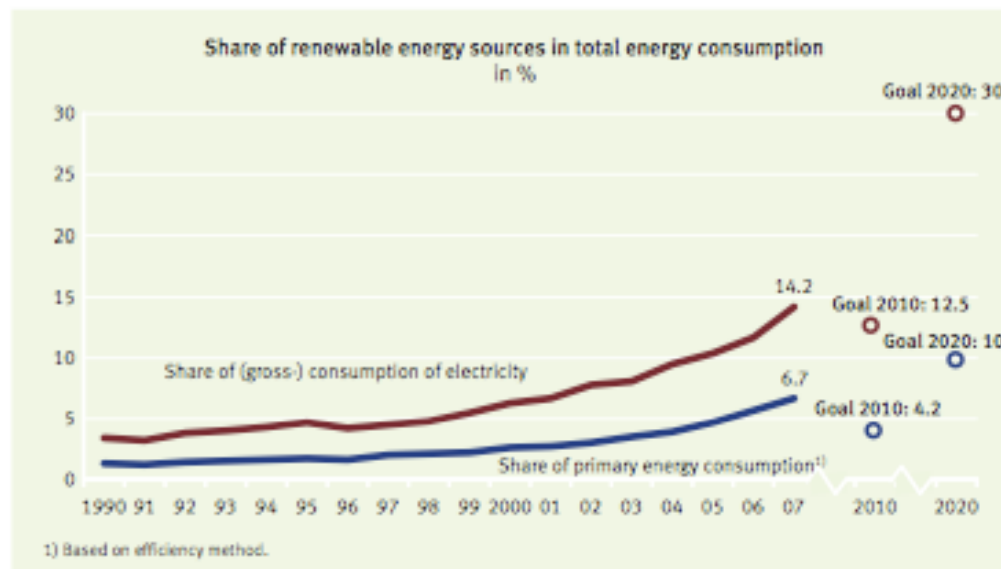
The use of energy occupies a key position in the economic process because almost every production activity is either directly or indirectly associated with the consumption of energy. Private households use energy particularly for heating their homes and water, using electrical appliances as well as to run motor vehicles. The consumption of energy has a number of environmental effects, such as a detrimental impact on landscapes, ecological systems, the soil, water bodies and ground water due to the depletion of natural energy resources, emissions of harmful substances and greenhouse gas emissions with an effect on climate, the production of waste as well as the use of cooling water involved in converting and consuming energy sources. And, last but not least, the consumption of non-renewable resources is of special importance with regard to safeguarding the livelihood of future generations.

The Sustainability Strategy of the Federal Government takes into consideration the major importance of energy, both from an economic and environmental perspective,



## Renewable energies

### Strengthening a Sustainable Energy Supply
















Source: Working Group on Renewable Energies – Statistics (AGEE-Stat), Working Group on Energy Balances (AGEB), Zentrum für Sonnenenergie- und Wasserstoffforschung Baden-Württemberg (ZSW) (Centre for Solar Energy and Hydrogen Research Baden-Württemberg), Federal Ministry for the Environment, Nature Conservation and Nuclear Safety; June 2008















### 3a,b Share of renewable energy sources in total energy consumption

The reserves of important fossil energy sources such as oil and gas are limited, and their use is associated with greenhouse gas emissions. The goal of the Sustainability Strategy is therefore to promote the development of renewable sources of energy. Renewable sources of energy are energy sources which can be derived from natural processes which are constantly regenerated. Renewable energies include hydro-power, wind power, solar energy and geothermal energy, but also biomass such as firewood and the biodegradable portions of domestic refuse.

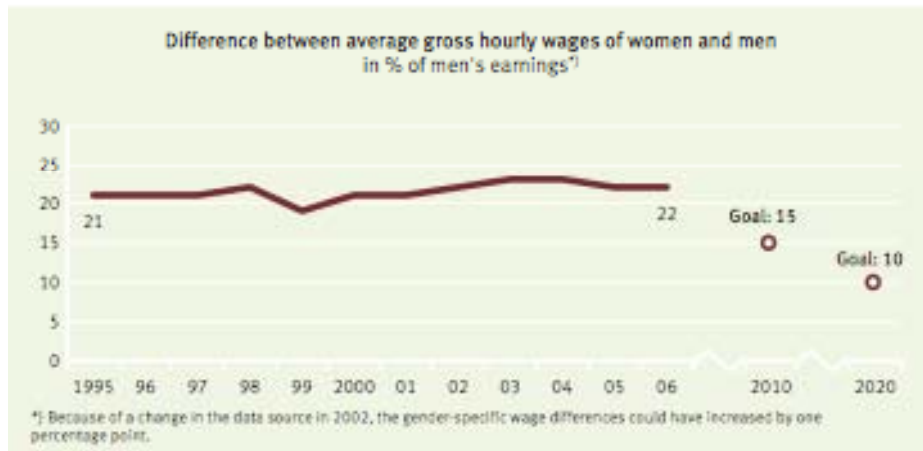
The development of the use of renewable energy is measured in the Sustainability Strategy by means of the indicators 'Share of renewable energy in total primary energy consumption' and 'Share of electrical power from renewable sources in total power generation'. The aim of the Federal Government is to increase the share of renewable energy in primary energy consumption to 4.2 % and the share in elec-

Contin.

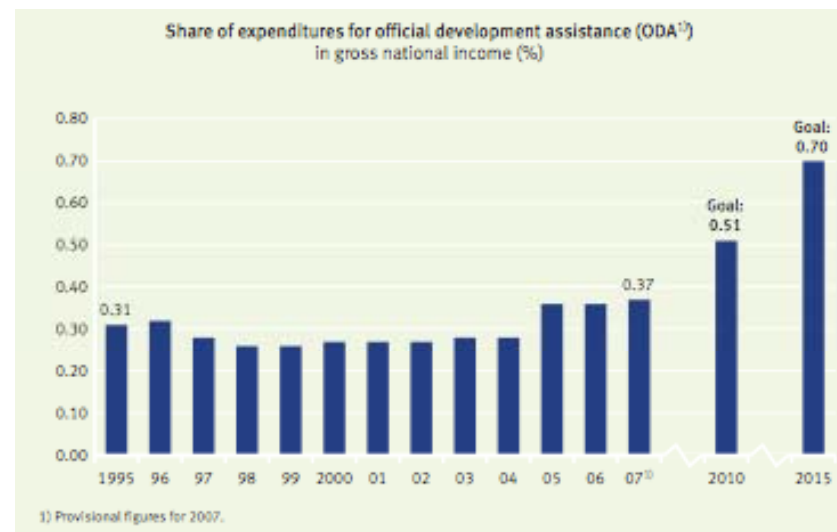
| No.                        | Indicator areas<br>Sustainability axiom  | Indicators  | Goals   | Status  |
|----------------------------|--|---|---|---|
| 7                          | <b>Provision for future economic stability</b><br><i>Creating favourable investment conditions – securing long-term prosperity</i> | Gross fixed capital formation in relation to gross domestic product (GDP) | Increase in the share   |    |
| 8                          | <b>Innovation</b><br><i>Shaping the future with new solutions</i>  | Private and public spending on research and development                   | Increase to 3 % of GDP by 2010  |    |
| 9a                         | <b>Education and training</b><br><i>Continuously improving education and vocational training</i>                                   | 18- to 24-year-olds without a school leaving certificate                  | Reduction in proportion to 9 % by 2010 and 4,5 % by 2020                                      |    |
| 9b                         |  | 25-year-old university graduates  | Increase in proportion to 10 % by 2010 and 20 % by 2020                                       |    |
| 9c                         |  | Share of students starting a degree course                                | Increase to 40 % by 2010, followed by further increase and stabilisation at a high level      |    |
| <b>II. Quality of life</b> |  |   |   |   |
| 10                         | <b>Economic prosperity</b><br><i>Raising economic output by environmentally and socially compatible means</i>                      | Gross domestic product per capita   | Economic growth   |    |
| No.                        | Indicator areas<br>Sustainability axiom  | Indicators  | Goals   | Status  |
| 11a                        | <b>Mobility</b><br><i>Guaranteeing mobility – protecting the environment</i>   | Intensity of goods transport  | Reduction to 98 % in comparison to 1999 by 2010 and to 95 % by 2020                           |    |
| 11b                        |  | Intensity of passenger transport  | Reduction to 90 % in comparison to 1999 by 2010 and to 80 % by 2020                           |   |
| 11c                        |  | Share of rail transport in goods transport performance                    | Increase to 25 % by 2015  |  |
| 11d                        |  | Share of inland water transport in goods transport performance            | Increase to 14 % by 2015  |  |
| 12a                        | <b>Farming</b><br><i>Environmentally sound production in our cultivated landscape</i>  | Nitrogen surplus  | Reduction to 80 kg/hectare on land used for agriculture by 2010, further reduction by 2020    |  |
| 12b                        |  | Organic farming   | Increase of the share of organic farming on land used for agriculture to 20 % in coming years |  |
| 13                         | <b>Air quality</b><br><i>Keeping the environment healthy</i>   | Air pollution   | Reduce to 30 % compared to 1990 by 2010   |  |

| No.                                     | Indicator areas<br>Sustainability axiom  | Indicators   | Goals   | Status  |
|---|--|--|---|---|
| 14a                                     | <b>Health and nutrition</b><br><i>Living more healthily for longer</i>                         | Premature mortality (cases of death per 100,000 residents under 65) men            | Reduction to 190 cases per 100,000 by 2015  |    |
| 14b                                     |  | Premature mortality (cases of death per 100,000 residents under 65) women          | Reduction to 115 cases per 100,000 by 2015  |    |
| 14c                                     |  | Proportion of adolescents who smoke (12- to 17-year-olds)                          | Decrease to under 12 % by 2015  |    |
| 14d                                     |  | Proportion of adults who smoke (15 years and older)                                | Decrease to under 22 % by 2015  |    |
| 14e                                     |  | Proportion of obese people (adults, 18 and older)                                  | Reduction by 2020   |    |
| 15                                      | <b>Crime</b><br><i>Further increasing personal security</i>                                    | Burglaries in homes  | Reduction in cases to under 100,000/year by 2015  |    |
| <b>III. Social cohesion</b>             |  |  |   |   |
| 16a                                     | <b>Employment</b><br><i>Boosting employment levels</i>   | Employment rate (total) (15- to 64-year-olds)                                      | Increase to 73 % by 2010 and 75 % by 2020   |    |
| 16b                                     |  | Employment rate (older people) (55- to 64-year-olds)                               | Increase to 55 % by 2010 and 57 % by 2020   |    |
| No.                                     | Indicator areas<br>Sustainability axiom  | Indicators   | Goals   | Status  |
| 17a                                     | <b>Perspectives for families</b><br><i>Improving the compatibility of work and family life</i> | All-day care provision for children (0- to 2-year-olds)                            | Increase to 30 % by 2010 and 35 % by 2020   |    |
| 17b                                     |  | All-day care provision for children (3- to 5-year-olds)                            | Increase to 30 % by 2010 and 60 % by 2020   |   |
| 18                                      | <b>Equal opportunities</b><br><i>Promoting equal opportunities in society</i>                  | Wage difference between women and men  | Reduce the difference to 15 % by 2010 and to 10 % by 2020   |  |
| 19                                      | <b>Integration</b><br><i>Integration instead of exclusion</i>                                  | Foreign school leavers with a school leaving certificate                           | Increase in the proportion of foreign school leavers with at least Hauptschule certificate and alignment with quota for German school leavers by 2020 |  |
| <b>IV. International responsibility</b> |  |  |   |   |
| 20                                      | <b>Development cooperation</b><br><i>Supporting sustainable development</i>                    | Share of expenditures for official development assistance in gross national income | Increase to 0.51 % by 2010 and 0,7 % by 2015  |  |
| 21                                      | <b>Opening markets</b><br><i>Improving trade opportunities for developing countries</i>        | German imports from developing countries   | Further increase  |  |

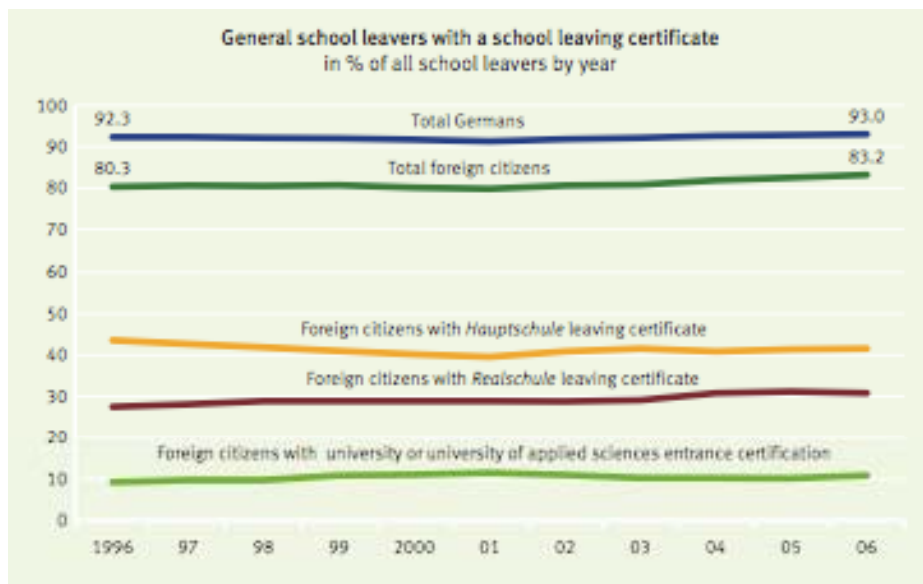
### 18 Wage difference between women and men



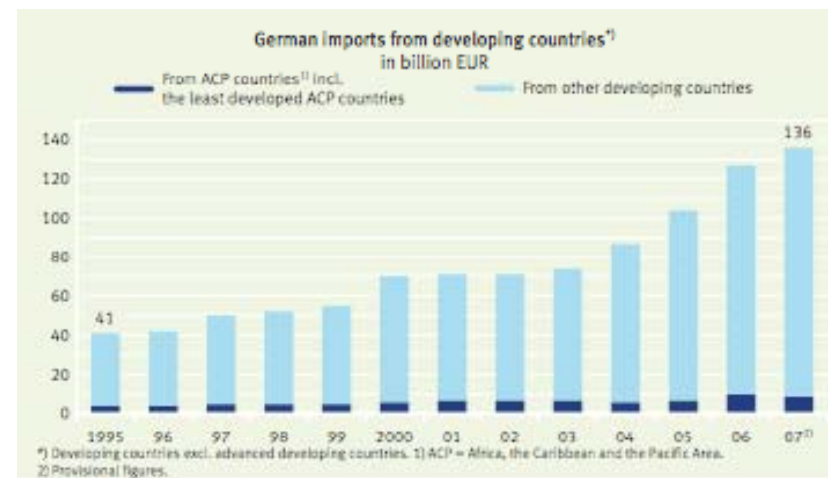
### 20 Share of expenditures for official development assistance in gross national income



### 19 Foreign school leavers with a school leaving certificate



### 21 German imports from developing countries



# How to measure and track Sustainability?

| NO. | 事例                                       |                                |  |
|-----|--|--------------------------------|--|
| 1   | 国際競争力ランキング                               | 国際経営開発研究所 (IM D)               | 世界の60カ国の競争力ランキングを323の基準で毎年報告している。総合ランキングでは、日本は23位(2004年)。  |
| 2   | NationMaster.com                         |                                | 世界各国の4000を超える統計データが見られる。図で国別比較もできる。                        |
| 3   | Environmental Sustainability Index (ESI) | コロンビア大学、エール大学                  | 5つの構成要素で、21の指標を設定。   |
| 4   | 主要環境指標                                   | 経済協力開発機構 (OECD)                | 気候変動、オゾン層など10の指標   |
| 5   | 環境指標                                     | 国連環境計画・アジア太平洋地域事務所 (UNEP/ROAP) | 北東アジア、中央アジアなど地域別に環境指標を設定した                                 |
| 6   | The Wellbeing of Nation                  | 国際自然連合 (IUCN)                  | 180カ国の持続可能性をランキング  |
| 7   | 人間開発報告書                                  | 国連開発計画                         | 人間開発指数(1人当たりのGDP、平均寿命、就学率から算出)を開発の度合いを測定する尺度として設定、毎年報告書を作成 |
| 8   | 持続可能な開発のための指標と情報システム                     | ドネラH.メドウズ                      | バラトングループへの報告として1998年に作成。持続可能性指標のフレームワークが提案されている。           |
| 9   | Limits to Growth: The 30-Year Update     | ドネラH.メドウズ                      | 1972年に出された「成長の限界」の改訂版。                                     |
| 10  | 持続可能な開発指標                                | 国連持続可能な開発委員会 (CSD)             | 経済、環境、社会、制度の4つのフレームで指標を設定                                  |

# Limits to Growth – The 30-Year Update

Key question:

Are current policies leading to a sustainable future or to collapse? What can be done to create a human economy that provides sufficiently for all?

⇒ Systems Thinking

⇒ Computer Modeling (exponential growth, feedback loops, sources & sinks, overshoot..)

⇒ 10 different scenarios

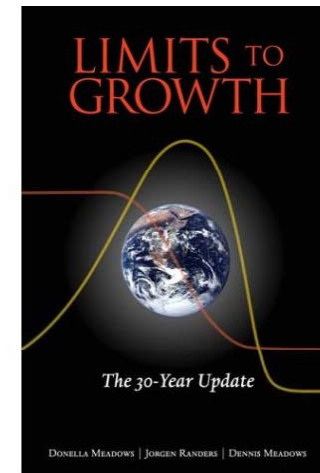
⇒ Asking for Choice

# “Limits to Growth – The 30-Year Update”

## Some quotations

*“We worry that current policies will produce global overshoot and collapse through ineffective efforts to anticipate and cope with ecological limits.”*

*“Ecological overshoot seems to us to be a much more important concept in the 21<sup>st</sup> century than free trade. But it is far behind in the fight for public attention and respect. This book is a new attempt to close that gap.”*



# Key points

1. 10 different pictures of how the 21<sup>st</sup> century may evolve
2. Purpose is to encourage learning, reflection, and personal choice.
3. Report will be updated in 2012 – there will be abundant data to test the reality
4. “You have to form your own opinion about causes and consequences of growth in the human ecological foot print.”



# World 3 Model – looking at dynamic systems

- ✓ Sets of interconnected material and immaterial elements that change overtime
  - ✓ Many elements of demography, economy, and the environment as one planetary system
    - Stocks and flows
    - feedback loops
    - sources & sinks
    - thresholds
    - Overshoot
- => See demo simulation soft “Stella”

# “Overshoot”

<daily examples>

hangover, driving on icy road, CFCs, stock market...

<Causes>

- Growth, acceleration, rapid change
- Limit, barrier
- Delay or mistake in the perceptions and the responses that strive to keep the systems within its limits

<Results>

- Crash of some kind
- Deliberate turnaround, correction, careful easing down

# World 3 Model - Lesson

▪ When do we start observing the effect of “overshoot”?

⇒ First decade of the 21<sup>st</sup> century will still be a period of growth.

⇒ It will take another decade before the consequences of overshoot are clearly observable and two decades before the overshoot is generally acknowledged.

# Lessons from World3

## ✓ Change the “structure”

- Change feedback structure/information links in the system
- Change the content and timeliness of the data that actors in the system have to work with
- Change the ideas, goals, incentives, costs, and feedbacks that motivates or constrain behavior
- In time, system with a new information structure is likely to change its social and physical structures.
- It may develop new laws, organizations, technologies, people with new skills, machines and buildings.
- Such a transformation need not be directed centrally; it can be unplanned, natural, evolutionary, exciting, joyful.

# The Environmental Sustainability Index (ESI)

- World Economic Forum, The Yale Center for Environmental Law and Policy, and the Columbia University
- a measure of overall progress towards environmental sustainability.
- 5 components
- Permits cross-national comparisons of environmental progress in a systematic and quantitative fashion.
- Published in 2002, updated in 2005.

## *The ESI in action...*

*“As a conceptual framework and analytic tool, the Environmental Sustainability Index has now been introduced to the policymaking discourse in the Philippines. As Chair of the Committee on Ecology in the House of Representatives, I have called on the government to be more serious about measuring the efficacy of programs and policies -- and the ESI provides a way to benchmark our performance and identify successful strategies.”*

*Neric Acosta  
Congressman and Chair of the Committee on Ecology  
Manila, The Philippines*



## Environmental Sustainability Index – Rankings and Scores

| ESI Rank | CountryName       | ESI Score | OECD Rank | Non-OECD Rank | ESI Rank | CountryName     | ESI Score | OECD Rank | Non-OECD Rank | ESI Rank | CountryName     | ESI Score | OECD Rank | Non-OECD Rank |
|----------|-------------------|-----------|-----------|---------------|----------|-----------------|-----------|-----------|---------------|----------|-----------------|-----------|-----------|---------------|
| 1        | Finland           | 75.1      | 1         |               | 50       | Cameroon        | 52.5      |           | 32            | 99       | Azerbaijan      | 45.4      |           | 73            |
| 2        | Norway            | 73.4      | 2         |               | 51       | Ecuador         | 52.4      |           | 33            | 100      | Kenya           | 45.3      |           | 74            |
| 3        | Uruguay           | 71.8      |           | 1             | 52       | Laos            | 52.4      |           | 34            | 101      | India           | 45.2      |           | 75            |
| 4        | Sweden            | 71.7      | 3         |               | 53       | Cuba            | 52.3      |           | 35            | 102      | Poland          | 45.0      | 27        |               |
| 5        | Iceland           | 70.8      | 4         |               | 54       | Hungary         | 52.0      | 19        |               | 103      | Niger           | 45.0      |           | 76            |
| 6        | Canada            | 64.4      | 5         |               | 55       | Tunisia         | 51.8      |           | 36            | 104      | Chad            | 45.0      |           | 77            |
| 7        | Switzerland       | 63.7      | 6         |               | 56       | Georgia         | 51.5      |           | 37            | 105      | Morocco         | 44.8      |           | 78            |
| 8        | Guyana            | 62.9      |           | 2             | 57       | Uganda          | 51.3      |           | 38            | 106      | Rwanda          | 44.8      |           | 79            |
| 9        | Argentina         | 62.7      |           | 3             | 58       | Moldova         | 51.2      |           | 39            | 107      | Mozambique      | 44.8      |           | 80            |
| 10       | Austria           | 62.7      | 7         |               | 59       | Senegal         | 51.1      |           | 40            | 108      | Ukraine         | 44.7      |           | 81            |
| 11       | Brazil            | 62.2      |           | 4             | 60       | Zambia          | 51.1      |           | 41            | 109      | Jamaica         | 44.7      |           | 82            |
| 12       | Gabon             | 61.7      |           | 5             | 61       | Bosnia & Herze. | 51.0      |           | 42            | 110      | United Arab Em. | 44.6      |           | 83            |
| 13       | Australia         | 61.0      | 8         |               | 62       | Israel          | 50.9      |           | 43            | 111      | Togo            | 44.5      |           | 84            |
| 14       | New Zealand       | 60.9      | 9         |               | 63       | Tanzania        | 50.3      |           | 44            | 112      | Belgium         | 44.4      | 28        |               |
| 15       | Latvia            | 60.4      |           | 6             | 64       | Madagascar      | 50.2      |           | 45            | 113      | Dem. Rep. Congo | 44.1      |           | 85            |
| 16       | Peru              | 60.4      |           | 7             | 65       | United Kingdom  | 50.2      | 20        |               | 114      | Bangladesh      | 44.1      |           | 86            |
| 17       | Paraguay          | 59.7      |           | 8             | 66       | Nicaragua       | 50.2      |           | 46            | 115      | Egypt           | 44.0      |           | 87            |
| 18       | Costa Rica        | 59.6      |           | 9             | 67       | Greece          | 50.1      | 21        |               | 116      | Guatemala       | 44.0      |           | 88            |
| 19       | Croatia           | 59.5      |           | 10            | 68       | Cambodia        | 50.1      |           | 47            | 117      | Syria           | 43.8      |           | 89            |
| 20       | Bolivia           | 59.5      |           | 11            | 69       | Italy           | 50.1      | 22        |               | 118      | El Salvador     | 43.8      |           | 90            |
| 21       | Ireland           | 59.2      | 10        |               | 70       | Bulgaria        | 50.0      |           | 48            | 119      | Dominican Rep.  | 43.7      |           | 91            |
| 22       | Lithuania         | 58.9      |           | 12            | 71       | Mongolia        | 50.0      |           | 49            | 120      | Sierra Leone    | 43.4      |           | 92            |
| 23       | Colombia          | 58.9      |           | 13            | 72       | Gambia          | 50.0      |           | 50            | 121      | Liberia         | 43.4      |           | 93            |
| 24       | Albania           | 58.8      |           | 14            | 73       | Thailand        | 49.7      |           | 51            | 122      | South Korea     | 43.0      | 29        |               |
| 25       | Central Afr. Rep. | 58.7      |           | 15            | 74       | Malawi          | 49.3      |           | 52            | 123      | Angola          | 42.9      |           | 94            |
| 26       | Denmark           | 58.2      | 11        |               | 75       | Indonesia       | 48.8      |           | 53            | 124      | Mauritania      | 42.6      |           | 95            |
| 27       | Estonia           | 58.2      |           | 16            | 76       | Spain           | 48.8      | 23        |               | 125      | Philippines     | 42.3      |           | 96            |
| 28       | Panama            | 57.7      |           | 17            | 77       | Guinea-Bissau   | 48.6      |           | 54            | 126      | Libya           | 42.3      |           | 97            |
| 29       | Slovenia          | 57.5      |           | 18            | 78       | Kazakhstan      | 48.6      |           | 55            | 127      | Viet Nam        | 42.3      |           | 98            |
| 30       | Japan             | 57.3      | 12        |               | 79       | Sri Lanka       | 48.5      |           | 56            | 128      | Zimbabwe        | 41.2      |           | 99            |
| 31       | Germany           | 56.9      | 13        |               | 80       | Kyrgyzstan      | 48.4      |           | 57            | 129      | Lebanon         | 40.5      |           | 100           |
| 32       | Namibia           | 56.7      |           | 19            | 81       | Guinea          | 48.1      |           | 58            | 130      | Burundi         | 40.0      |           | 101           |
| 33       | Russia            | 56.1      |           | 20            | 82       | Venezuela       | 48.1      |           | 59            | 131      | Pakistan        | 39.9      |           | 102           |
| 34       | Botswana          | 55.9      |           | 21            | 83       | Oman            | 47.9      |           | 60            | 132      | Iran            | 39.8      |           | 103           |
| 35       | P. N. Guinea      | 55.2      |           | 22            | 84       | Jordan          | 47.8      |           | 61            | 133      | China           | 38.6      |           | 104           |
| 36       | France            | 55.2      | 14        |               | 85       | Nepal           | 47.7      |           | 62            | 134      | Tajikistan      | 38.6      |           | 105           |
| 37       | Portugal          | 54.2      | 15        |               | 86       | Benin           | 47.5      |           | 63            | 135      | Ethiopia        | 37.9      |           | 106           |
| 38       | Malaysia          | 54.0      |           | 23            | 87       | Honduras        | 47.4      |           | 64            | 136      | Saudi Arabia    | 37.8      |           | 107           |
| 39       | Congo             | 53.8      |           | 24            | 88       | Côte d'Ivoire   | 47.3      |           | 65            | 137      | Yemen           | 37.3      |           | 108           |
| 40       | Netherlands       | 53.7      | 16        |               | 89       | Serbia & Mont.  | 47.3      |           | 66            | 138      | Kuwait          | 36.6      |           | 109           |
| 41       | Mali              | 53.7      |           | 25            | 90       | Macedonia       | 47.2      |           | 67            | 139      | Trinidad & Tob. | 36.3      |           | 110           |
| 42       | Chile             | 53.6      |           | 26            | 91       | Turkey          | 46.6      | 24        |               | 140      | Sudan           | 35.9      |           | 111           |
| 43       | Bhutan            | 53.5      |           | 27            | 92       | Czech Rep.      | 46.6      | 25        |               | 141      | Haiti           | 34.8      |           | 112           |
| 44       | Armenia           | 53.2      |           | 28            | 93       | South Africa    | 46.2      |           | 68            | 142      | Uzbekistan      | 34.4      |           | 113           |
| 45       | United States     | 52.9      | 17        |               | 94       | Romania         | 46.2      |           | 69            | 143      | Iraq            | 33.6      |           | 114           |
| 46       | Myanmar           | 52.8      |           | 29            | 95       | Mexico          | 46.2      | 26        |               | 144      | Turkmenistan    | 33.1      |           | 115           |
| 47       | Belarus           | 52.8      |           | 30            | 96       | Algeria         | 46.0      |           | 70            | 145      | Taiwan          | 32.7      |           | 116           |
| 48       | Slovakia          | 52.8      | 18        |               | 97       | Burkina Faso    | 45.7      |           | 71            | 146      | North Korea     | 29.2      |           | 117           |
| 49       | Ghana             | 52.8      |           | 31            | 98       | Nigeria         | 45.4      |           | 72            |          |                 |           |           |               |

Note: The 2005 ESI scores are not directly comparable to the 2002 ESI scores. See Appendix A for details on methodological changes.

The 2005 Environmental Sustainability Index (ESI) benchmarks the ability of nations to protect the environment over the next several decades. It does so by integrating 76 data sets – tracking natural resource endowments, past and present pollution levels, environmental management efforts, and a society's capacity to improve its environmental performance – into 21 indicators of environmental sustainability.

These indicators permit comparison across the following five fundamental components of sustainability: Environmental Systems; Environmental Stresses; Human Vulnerability to Environmental Stresses; Societal Capacity to Respond to Environmental Challenges; and Global Stewardship.

The issues reflected in the indicators and the underlying variables were chosen through an extensive review of the environmental literature, assessment of available data, rigorous analysis, and broad-based consultation with policymakers, scientists, and indicator experts.

The ESI provides a powerful environmental decisionmaking tool tracking national environmental performance and facilitating

comparative policy analysis. It enables a more data-driven and empirical approach to policymaking.

While absolute measures of sustainability remain elusive, many aspects of environmental sustainability can be measured on a relative basis with results that provide a context for policy evaluations and judgments. Such comparisons are especially important in the new context of worldwide efforts to advance the environment-related aspects of the Millennium Development Goals.

Higher ESI scores suggest better environmental stewardship. The five highest-ranking countries are Finland, Norway, Uruguay, Sweden, and Iceland – all countries that have substantial natural resource endowments, low population density, and have managed the challenges of development with some success.

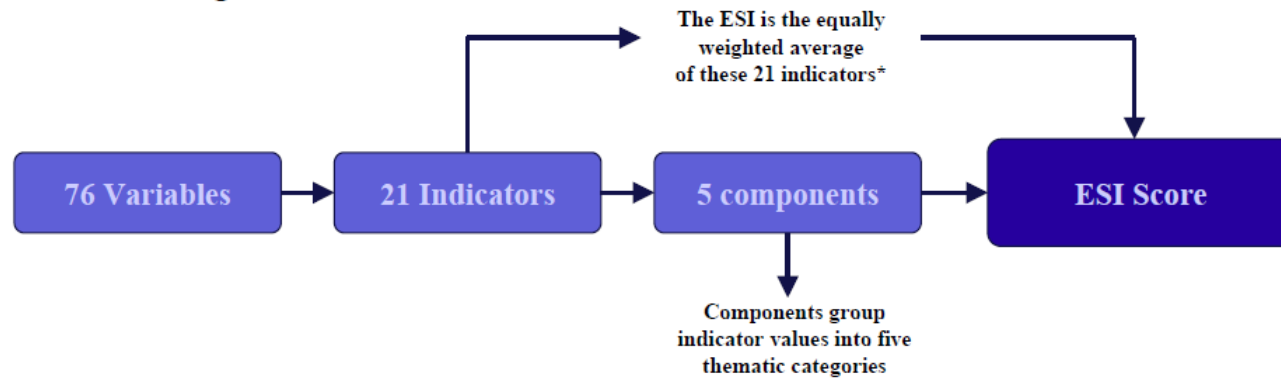
The lowest ranking countries are North Korea, Iraq, Taiwan, Turkmenistan, and Uzbekistan. These countries face numerous issues, both natural and manmade, and have not managed their policy choices well.

A number of core policy conclusions emerge from the ESI analysis:

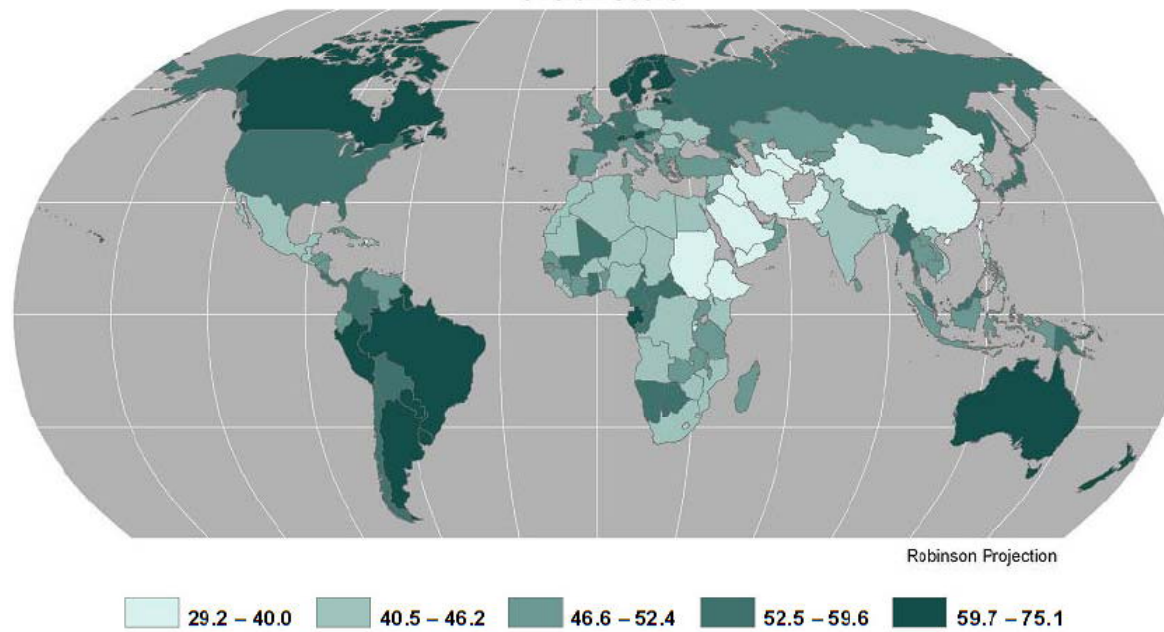
- The ESI provides a valuable tool for benchmarking environmental stewardship and permits comparative policy analysis.
- Environmental stewardship demands attention to a wide range of pollution control and natural resource management issues.
- Developing and developed countries face distinct environmental challenges – the pollution pressures of industrialization on one hand and the stresses of poverty and incapacity on the other.
- Economic success contributes to the potential of environmental success but does not guarantee it. Environmental stewardship depends on both policy efforts and a society's over-arching social, political, and economic systems.
- While it appears that no country is on a fully sustainable trajectory, at every level of development, some countries are managing their environmental challenges better than others.
- Measures of governance, including the rigor of regulation and the degree of cooperation with international policy efforts, correlate highly with overall environmental success. This result suggests that emphasis on good governance may be justified.
- The lack of reliable data to measure performance on a number of issues and across many countries hinders attempts to move toward more data-driven and empirical decisionmaking.



## Constructing the ESI



## Environmental Sustainability Index Country Scores by Quintile



\*Note: While the equal weighting of the indicators has some affect on ESI Scores, sensitivity analysis demonstrates the relative robustness of the ESI structure.

# Environmental Performance Index (EPI)

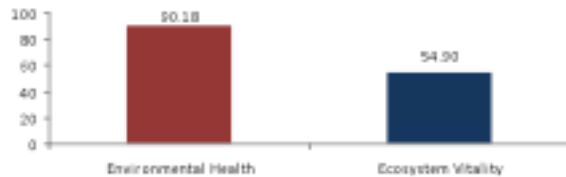
## Japan

EAST ASIA AND THE PACIFIC

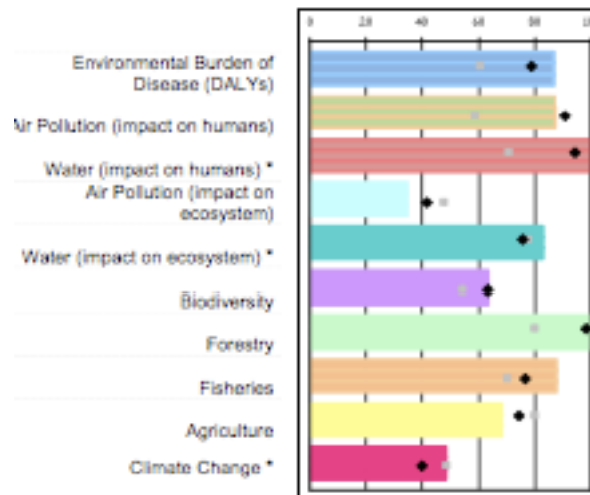
GDP/capita 2007 est. (PPP) \$31,689  
Income Decile 2 (1=high, 10=low)

| 2010 ENVIRONMENTAL PERFORMANCE INDEX |      |
|--------------------------------------|------|
| Rank:                                | 20   |
| Score:                               | 72.5 |
| Income Group Average:                | 66.1 |
| Geographic Group Average:            | 57.1 |

### Environmental objectives:



### Policy Categories



### Indicators

| Indicator  | Value      | Target  | Proximity to Target (100=target met) |
|--|------------|---------|--------------------------------------|
| DALY: Environmental Burden of Disease (DALY)   | 15.0       | 0       | 86.9                                 |
| INDOOR: Indoor air pollution (%)   | 5.0        | 100     | 94.7                                 |
| OUTDOOR: Outdoor air pollution (µg/m <sup>3</sup> )                                    | 29.6       | 100     | 79.3                                 |
| ACSAT: Access to sanitation (%)*   | 100.0      | 100     | 100.0                                |
| WATSUP: Access to water (%)  | 100.0      | 100     | 100.0                                |
| SO2: Sulfur dioxide emissions (Gg/1000 sq km)  | 2.1        | <= 0.01 | 44.2                                 |
| NOX: Nitrogen oxides emissions (Gg/1000 sq km)   | 5.3        | <= 0.01 | 33.6                                 |
| NMVOC: Non-methane volatile organic compound emissions (Gg/1000 sq km)                 | 4.5        | <= 0.01 | 32.7                                 |
| OZONE: Ecosystem ozone (ppb)   | 64317701.1 | 0       | 9.3                                  |
| WQI: Water quality index *   | 87.5       | 100     | 87.5                                 |
| WSI: Water scarcity index  | 0.0        | 0       | 100.0                                |
| WATSTR: Water stress index   | 5.6        | 0       | 54.9                                 |
| PACOV: Some protection (%)   | 10.0       | >= 10   | 100.0                                |
| MPAEEZ: Marine protection (%)  | 0.2        | >= 10   | 7.6                                  |
| AZE: Critical habitat protection (%)   | 45.0       | 100     | 45.0                                 |
| FORGRO: Growing stock change (ratio)   | 1.1        | >= 1    | 100.0                                |
| FORCOV: Forest cover change (%)  | -          | >= 0    | -                                    |
| MTI: Marine trophic index (slope)  | 0.02       | >= 0    | 100.0                                |
| EEZTD: Trawling and dredging intensity (%)   | 24.7       | 0       | 75.3                                 |
| AGWAT: Agricultural water intensity (%)  | 12.8       | <= 10   | 90.0                                 |
| AGSUB: Agricultural subsidies (NRA)  | 0.7        | 0       | 0.0                                  |
| AGPEST: Pesticide regulation   | 22.0       | 22      | 100.0                                |
| GHGCAP: Greenhouse gas emissions per capita including land use emissions (Mt CO2 eq) * | 10.8       | 2.5     | 52.5                                 |
| GHGIND: Industrial greenhouse gas emissions intensity (CO2 per m\$ US\$)               | 65.1       | 36.3    | 72.2                                 |
| CO2KWH: CO2 emissions per electricity generation (CO2 per kWh) *                       | 490.4      | 0       | 15.9                                 |

# 1<sup>st</sup> lecture -- Lessons

## 1) What is Sustainability?

- Variety of definitions
- Conditions + Values (participation, equity, wellbeing, etc.)

## 2) How are countries responding?

- Climate change targets
- National strategies and indicators

## 3) How to measure and track it?

- Models / index