The Energy World Tour

Today and Tomorrow's Leaders Lunch

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blandine at mit.edu
(slides prepared with Elodie Renaud)
www.promethee-energie.org

MIT, April 18th, 2008

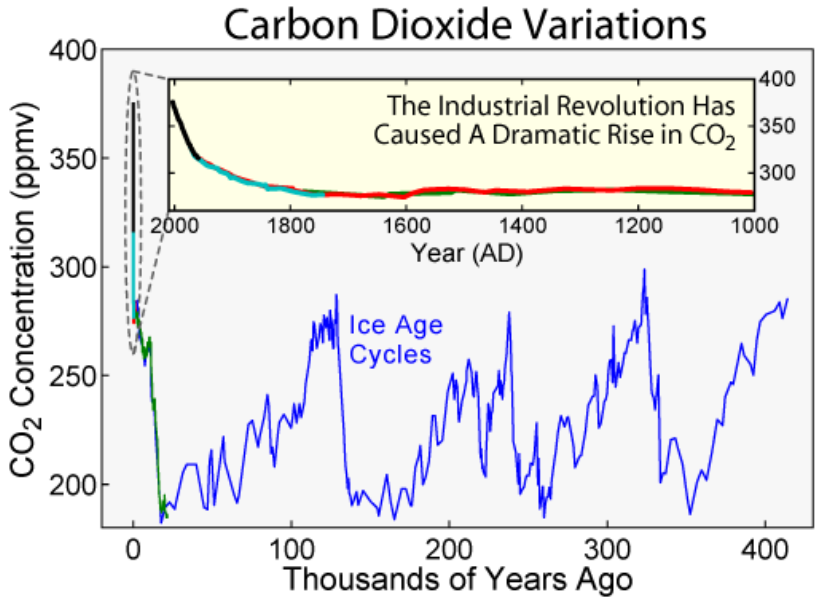
Energy, Development, Environment: related issues

- Quick reminder on the world's environmental and energetic situation
- Prométhée:
  a non profit committed to spread knowledge and will to take action
- The Energy World Tour: visiting projects around the world
  - More sustainable energy production
    - Gaz flaring on the wane
    - Tidal energy
    - Cheap solar energy?
  - Smarter energy consumption
  - Increased access to modern energy forms
    - Rural electrification
- What next?

Exceeding the planet's carrying capacity

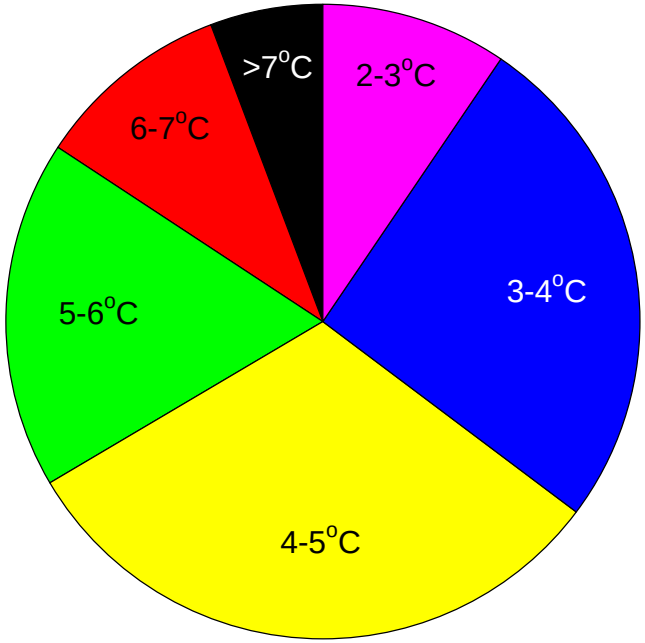
- 1987: « Our Common Future »
  - Brundtland Commission
  - Sustainable development

- 1997: Kyoto Protocol
  - 1800: [CO_2] = 280 ppm
  - 2008: [CO_2] = 385 ppm

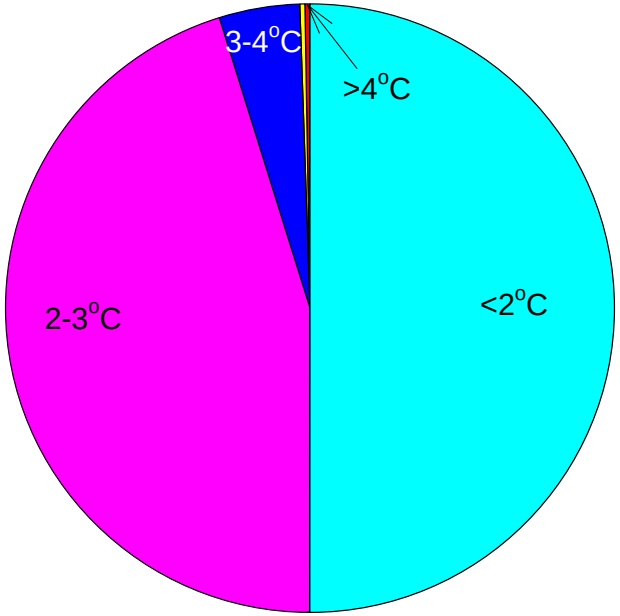


Exceeding the planet's carrying capacity

Probability of temperature evolution by 2100



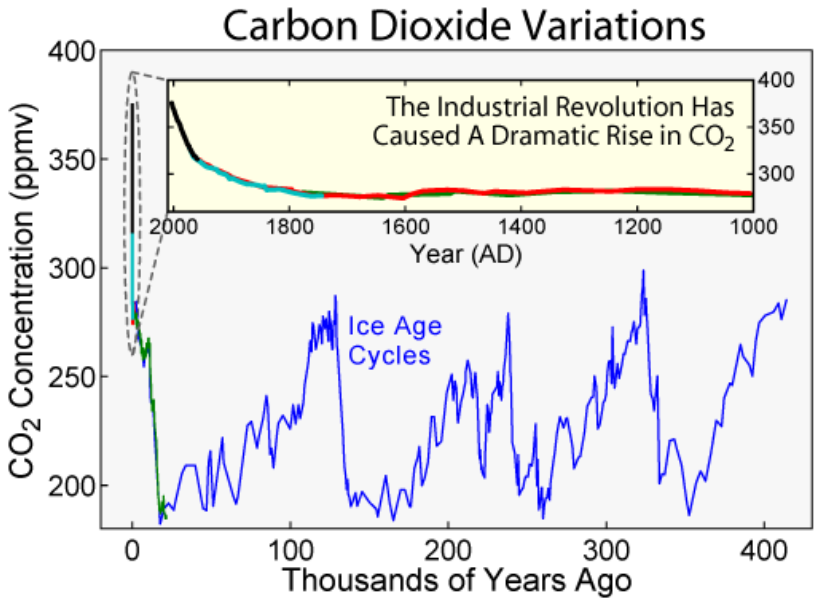
Without constraint on emissions



Cap at 550 ppm

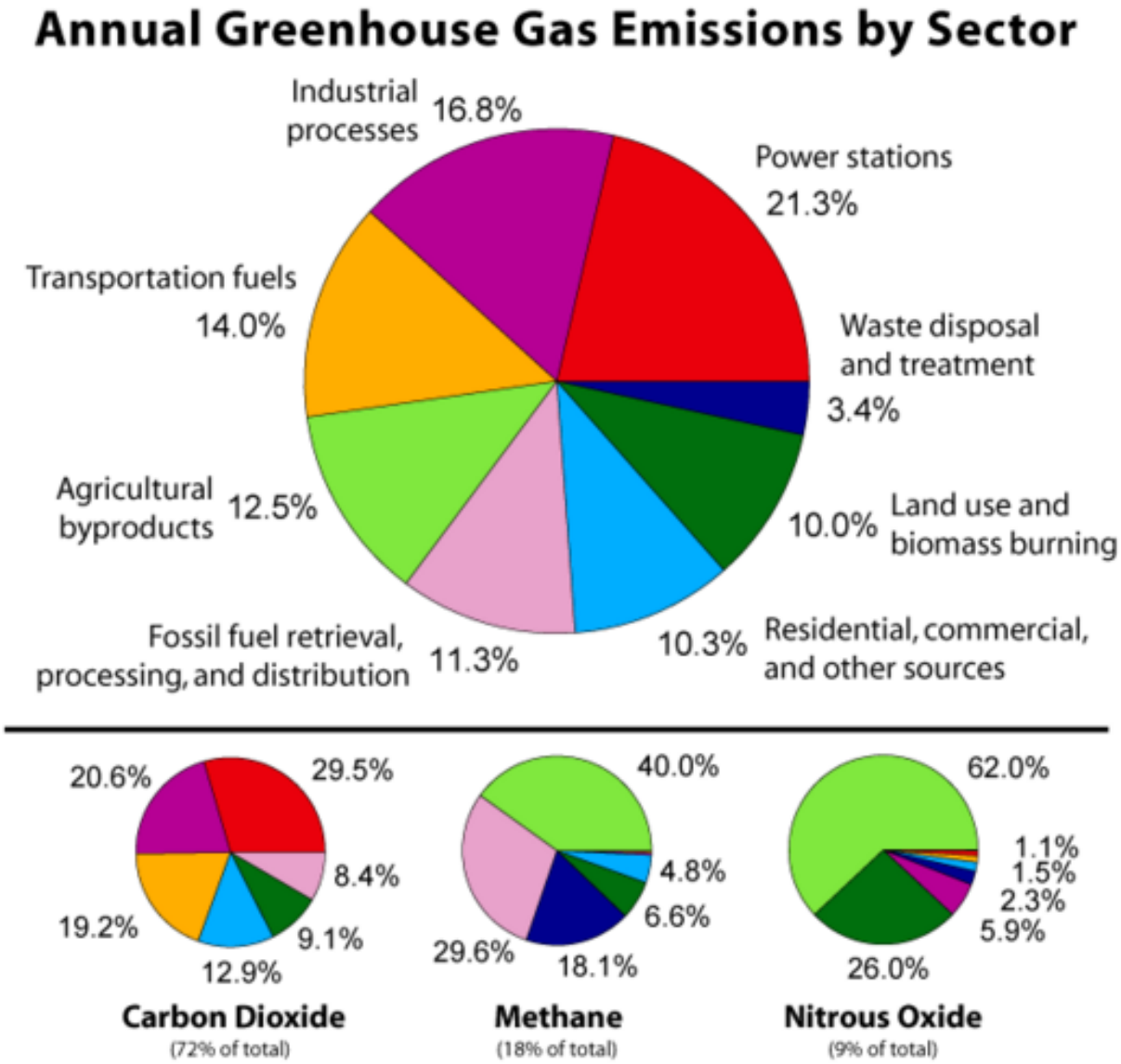
Courtesy of M. Webster,
MIT/Joint Program on the Science and Policy of Global Change

Exceeding the planet's carrying capacity



- 1987: « Our Common Future »
  - Brundtland Commission
  - Defined sustainable development
- 1997: Kyoto Protocol
- 2007: 10 and 20 years later
  - **IPCC** :
    - Confidence that human activities cause climate change : + 0,74°C since 1906
    - ΔT between 1,1 et 6,4°C by 2100
    - Severe consequences
  - **GEO-4** :
    - Urgent call for action
    - Human footprint: **21,9** ha/pers Earth's carrying capacity: **15,7** ha/pers

Energy is a major contributor to GHG emissions



Source: Global Warming Art, Robert A.Rohde

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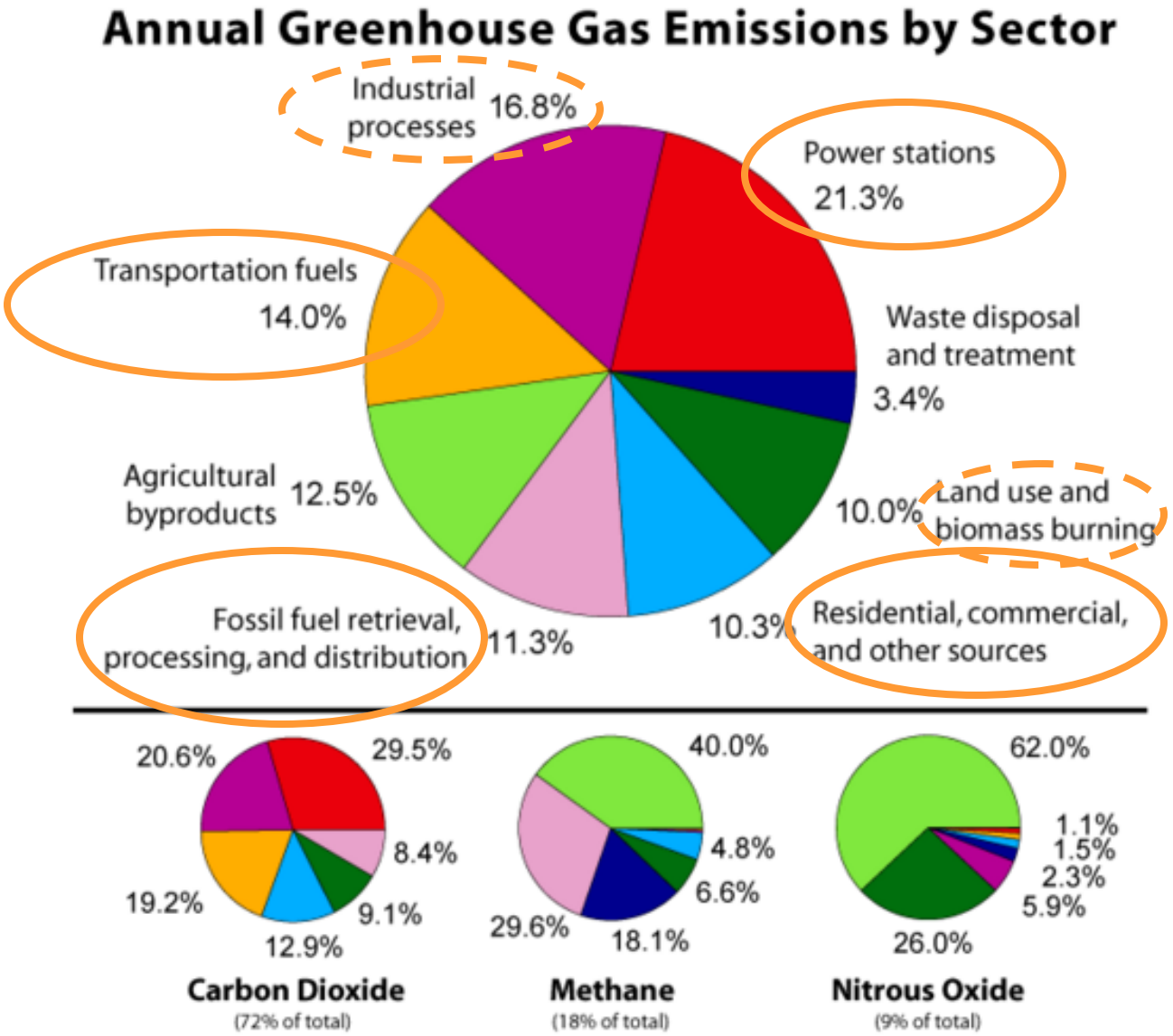

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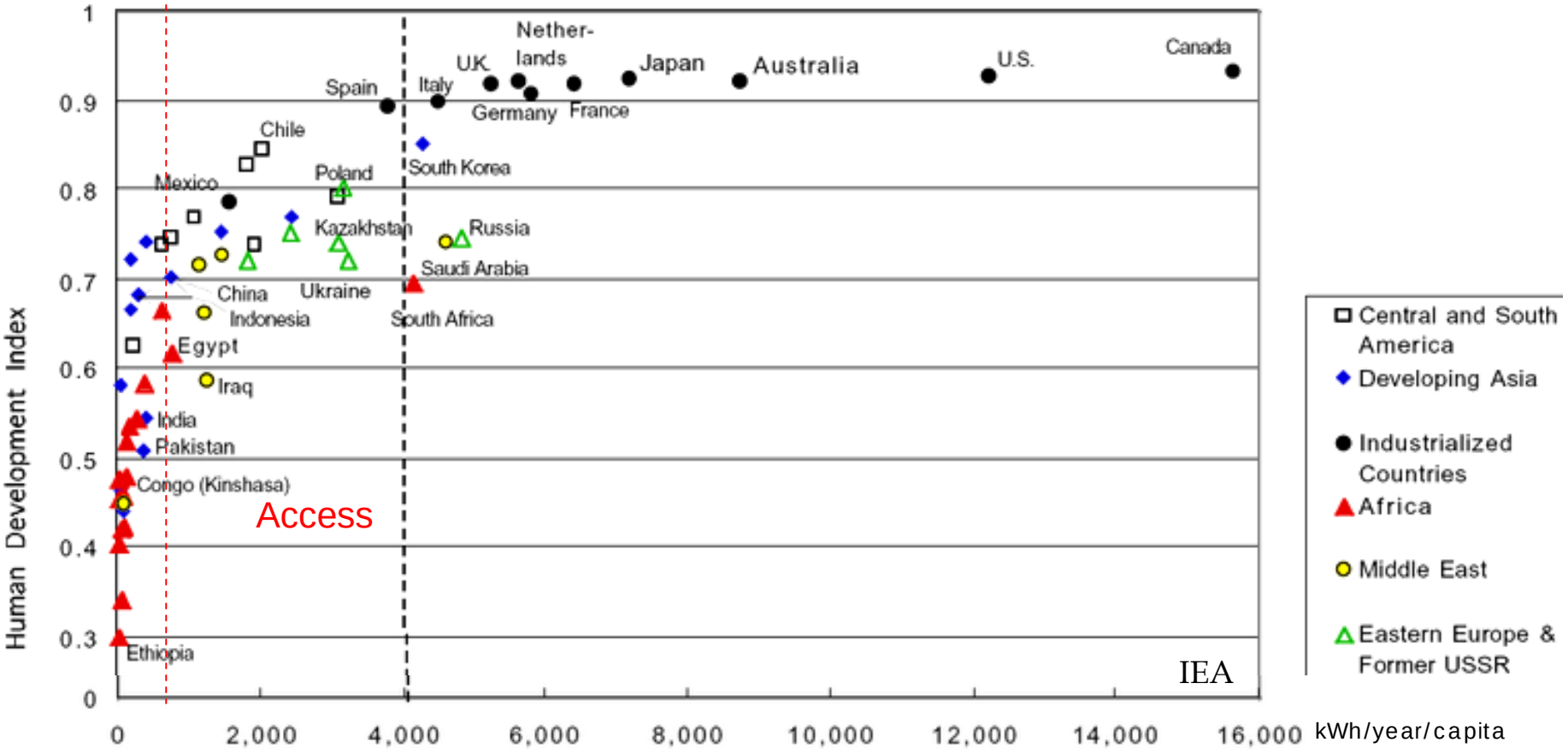
How to lower energy emissions ?



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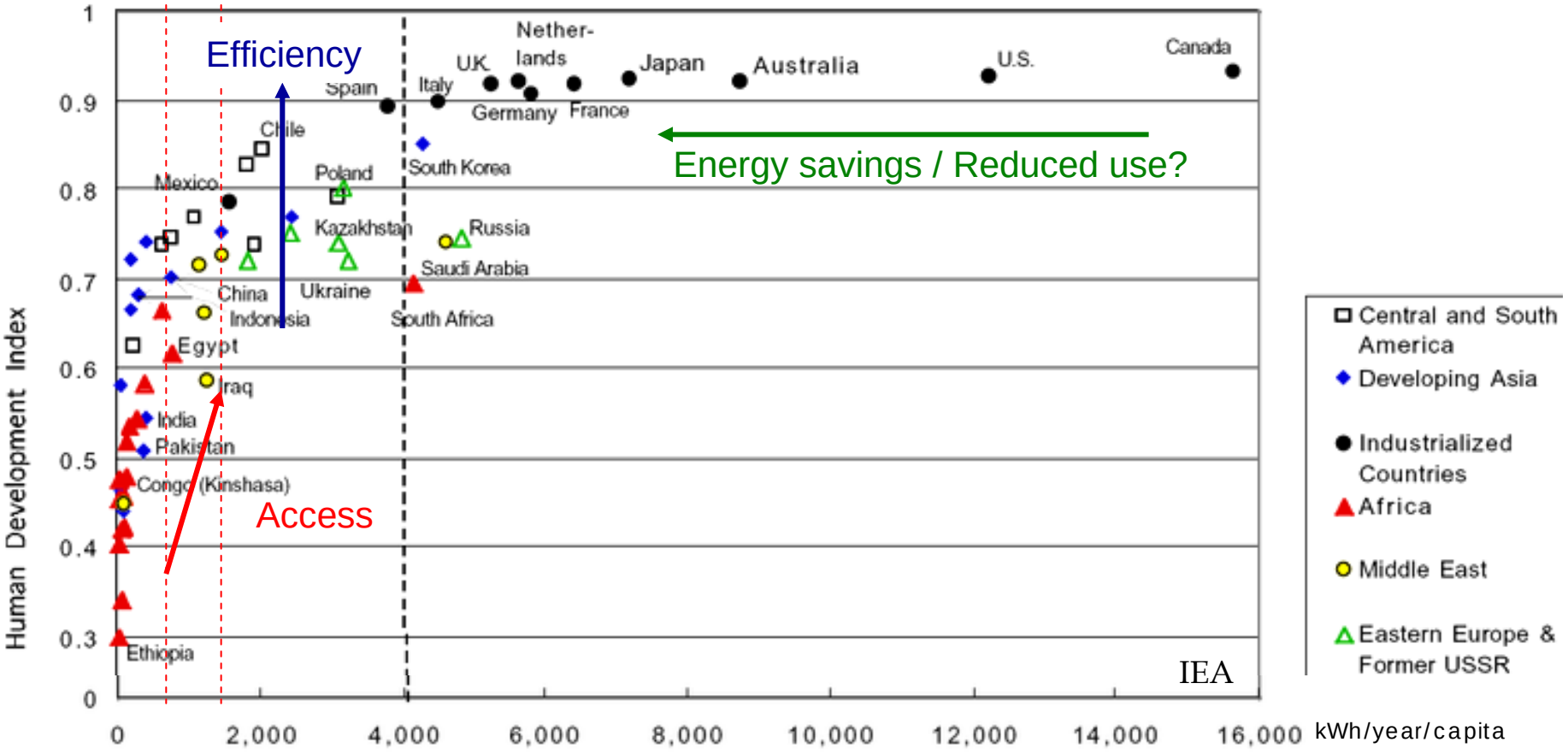

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¾ of man-made CO_2 emissions come from fossil fuel burning

- 21rst century Energy Challenges :
  - Global warming
  - Increased scarcity of fossil fuels
  - Energy and development

- A topic often deemed complex and inaccessible

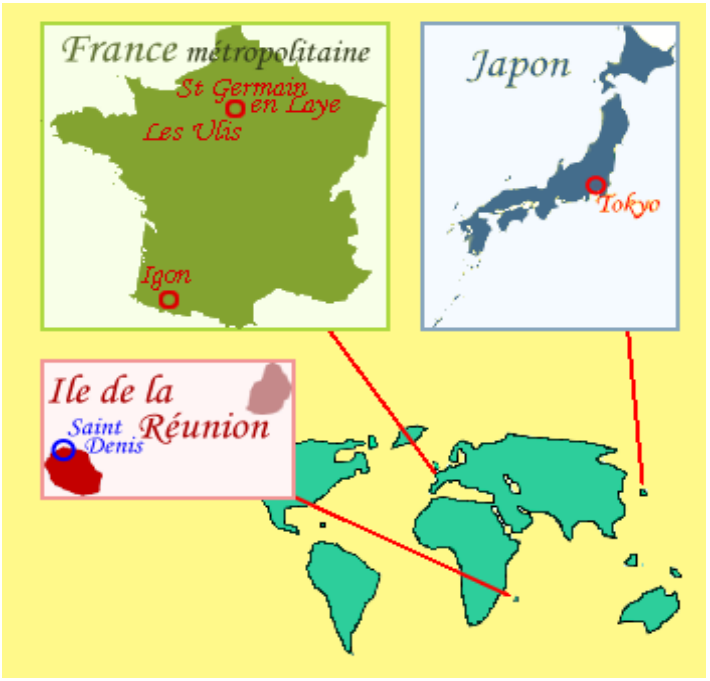
  → Foster interest

  → Empower lay people to understand current issues

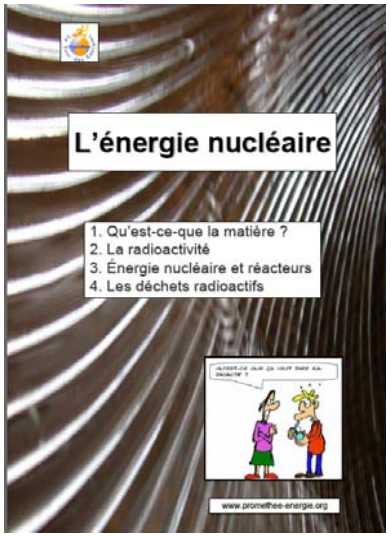
  How? June 2006: creation of the non-profit Prométhée

School partnership

- Pilot project from january to july 2007
- Large-scale : from september 2009



Class material : science in elementary school

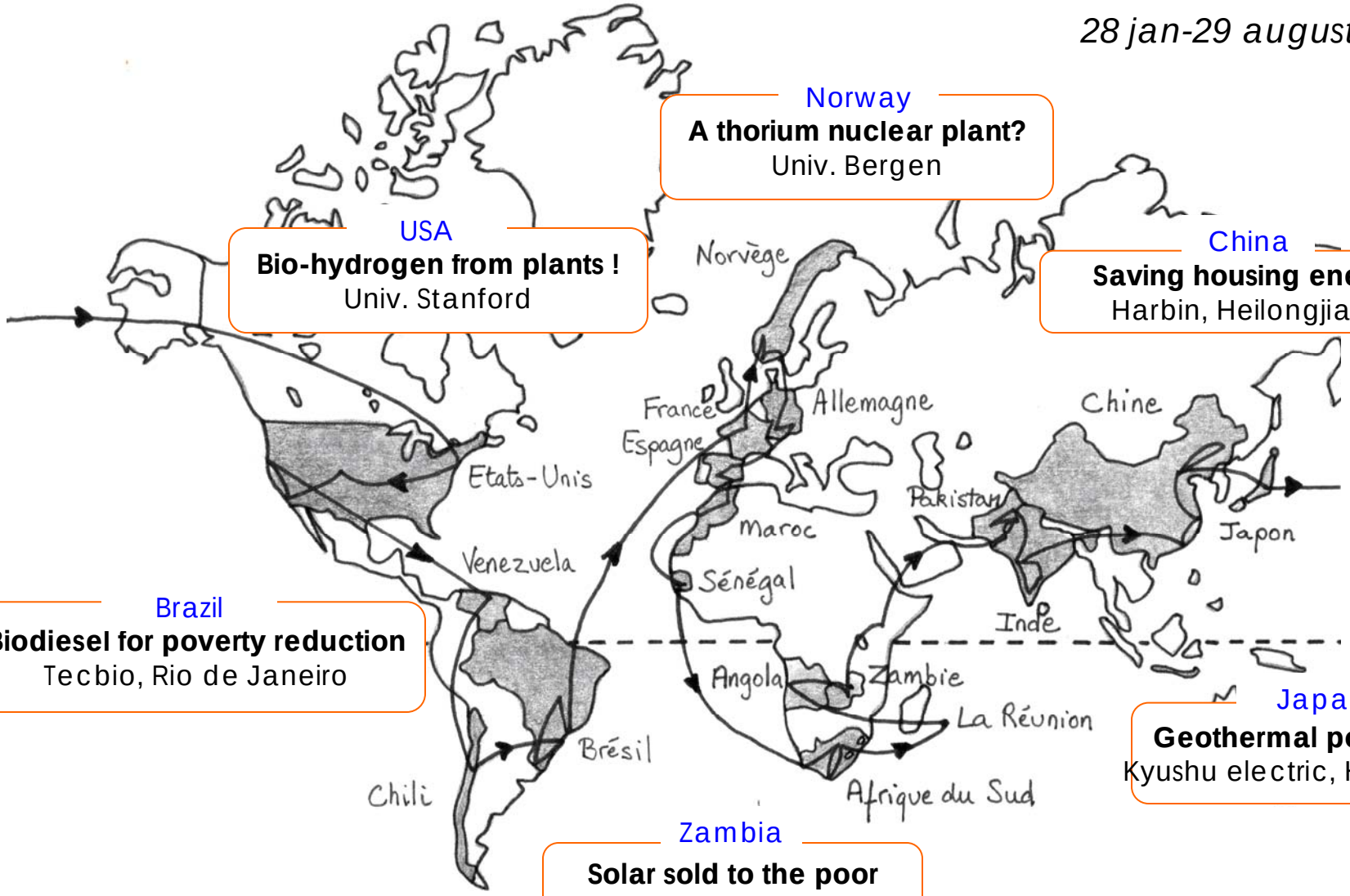


Free download on www.promethee-energie.org

Class material : science in elementary school

Solutions around the world: a few examples

28 jan-29 august 2007



Norway
A thorium nuclear plant?
Univ. Bergen

USA
Bio-hydrogen from plants !
Univ. Stanford

China
Saving housing energy
Harbin, Heilongjiang

Brazil
Biodiesel for poverty reduction
Tecbio, Rio de Janeiro

Japan
Geothermal power plant
Kyushu electric, Hacchobaru

Zambia
Solar sold to the poor
Suntech, Lusaka

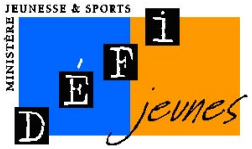
Partners of Prométhée's Energy World Tour

Private companies and their foundations

Non-profits and educational institutions

French and European institutions

Jeunesse



Media

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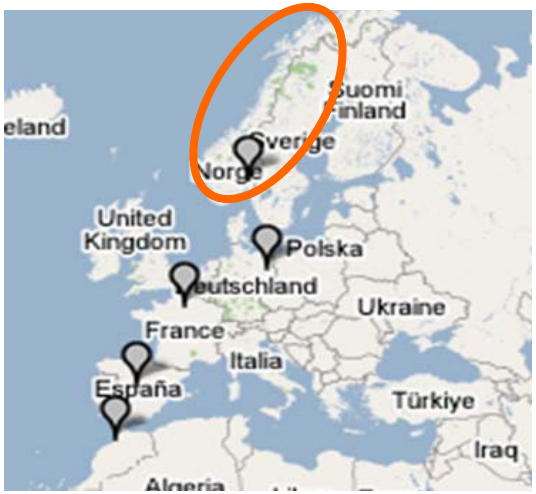
Gaz flaring: 5,5% of world nat. gaz use

FPSO Dalia, Total, Angola

Tidal energy: large but diffuse potential

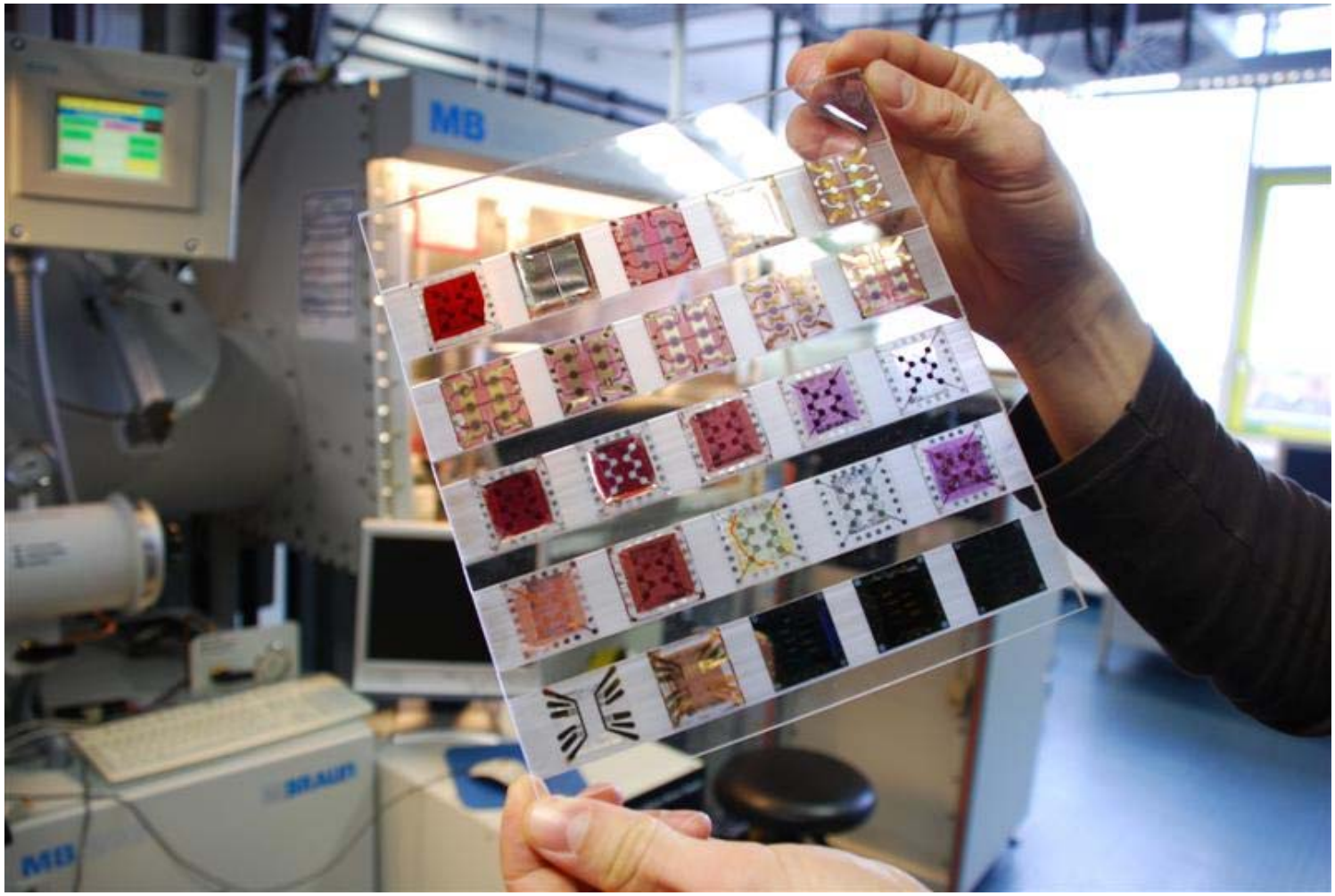
Hammerfest Strom, 1 MW each,
Hammerfest, Norway



Seagen, 1.2 MW
Stangford Lough, UK

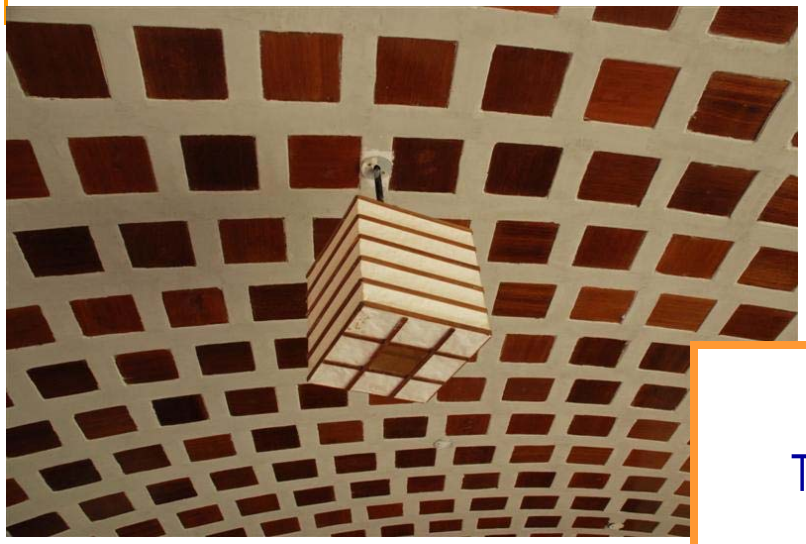
Hydrohélix, 5x0.2 = 1 MW
France

Cheap solar ?



Prototypes for organic solar cells, Fraunhofer Institute für Solar Energies, Freiburg, Germany
(joint center with MIT recently announced)

Smart energy use in buildings



T-ZED, BCIL, Bangalore, India

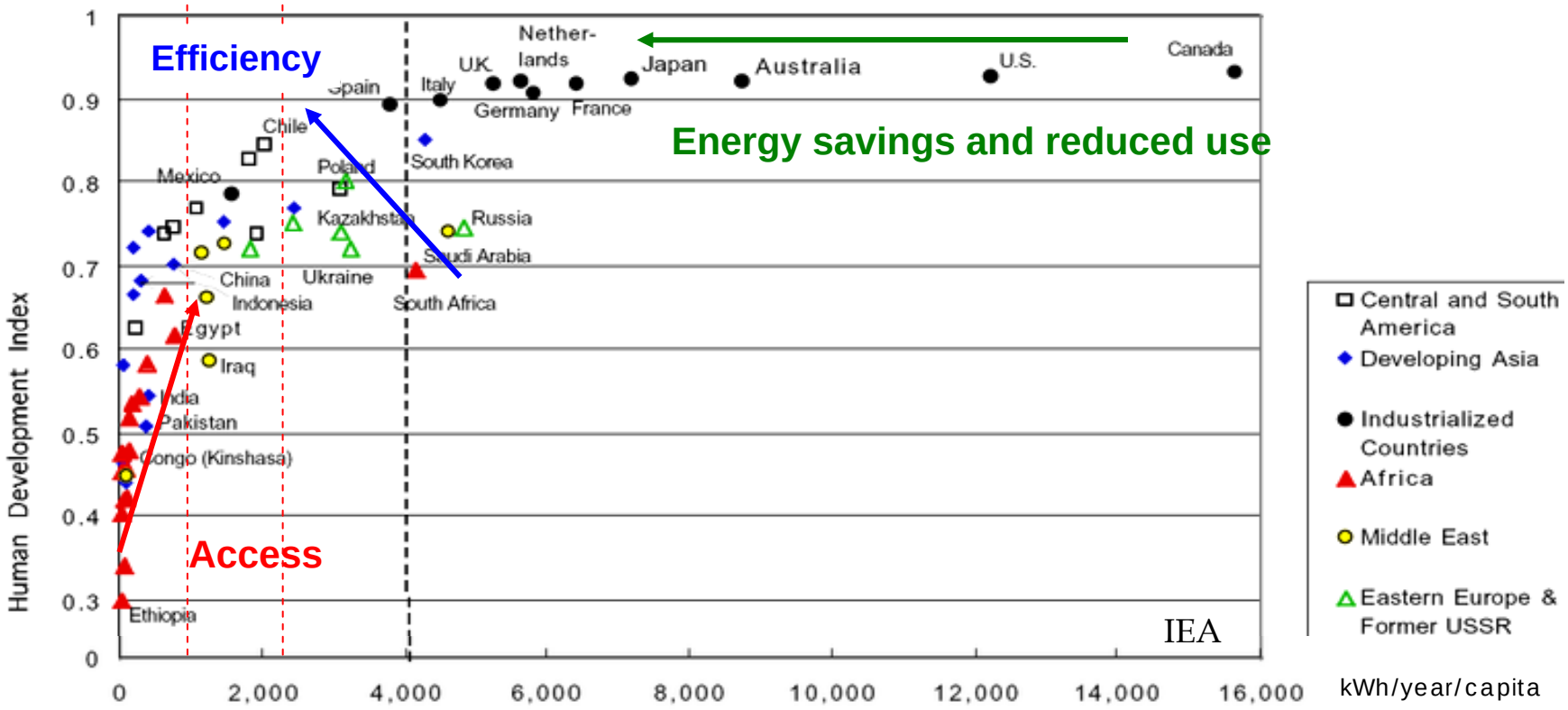
domestic fuel cells,
Tokyo Gas, Japan

Technology
&
Behavior

Vauban, Freiburg, Germany

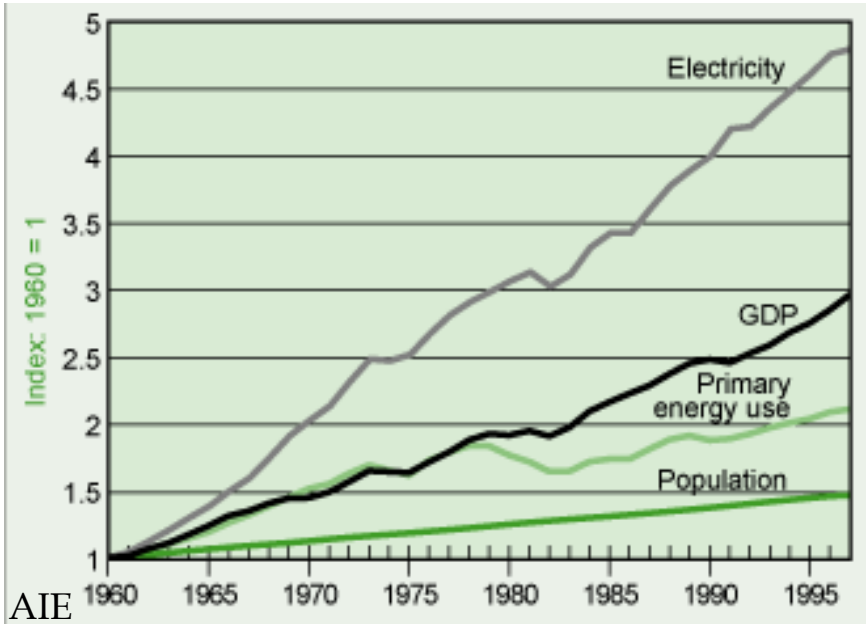
monitoring use, Univ. Hong-Kong

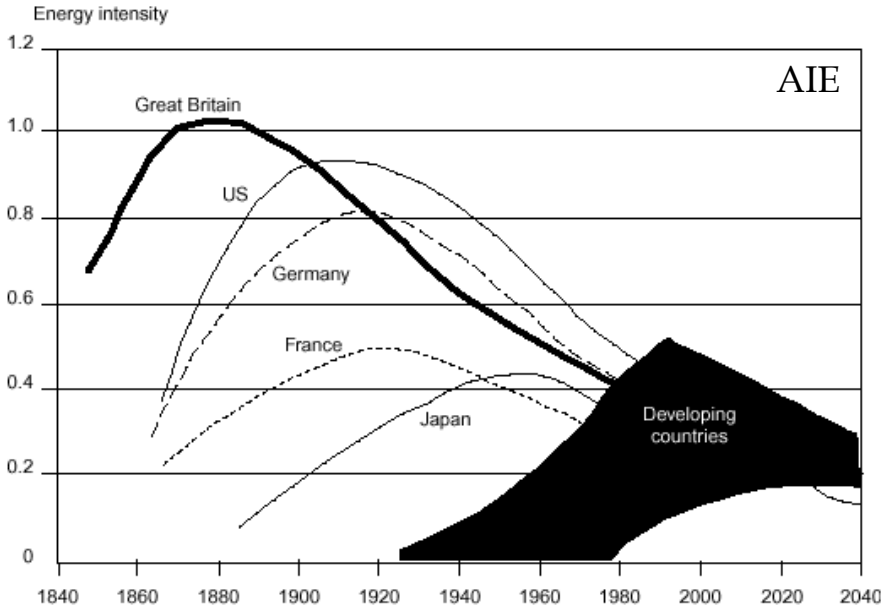
Energy for development: energy services



Energy for development: energy services

Decoupling GDP and energy paths





Sustainable development requires proper energy management

Goal : provice optimal energy services at **minimal economical cost**

- Reduce energy bill
- Secure energy supply
- Reduce environmental impact (local pollutions, GHG) and protect natural resources
- Reduce poverty

How?

- Increase access to modern energy forms
- Provide **High Quality** energy services
  - Demand management
  - Energy efficiency
  - Renewable energy

Barriers
(esp. in dvloping world)

- Utilities' vested interests
- High initial investment cost and lack of affordable financing schemes
- Energy prices and subsidies which distort consumer information
- Little availability of technical expertise

1.6 Billion people still lack access to electricity

PERG, near Settat, Morocco

Rural biodiesel unit, IIT Bombay, India

1. Increase access to modern forms of energy

Technological change: from traditional to modern energy mix

- Rural electrification :
  - Grid extension + decentralized production systems
  - Need for :
    - Strong political will
    - Preliminary study of needs
    - Subsidies for utilities
    - Adapt tarif to local revenues
    - Decentralize and educate
    - Provide for installation maintenance
    - Generate local revenues
- Butanisation
  - Subsidies issue
  - Aimed at urban areas

2. Use energy more efficiently

- Increase product efficiency
  - Optimize parameters of use
  - Technological switch
  - Market phase out of bad perfoming products

- Demand side management
  - Consumer behavior
  - Consumer buying habits

Need for sector specific policies

Eliminate social, economical and educational bareers via:

- Minimal standards
- Maintenance obligation
- Hourly tarifs
- Financing packages

Ex : improved cooking stoves, labelling/registration scheme for buildings

中国节能认证
Energy Conservation Certification

3. Increase renewable energy share

- Why?
  - Health
  - Environment
  - Economy
  - Marketing

- How ?
  - Help new technologies penetrate the market
    (fiscal and tarif tools, rules, financing schemes, demonstration projects)
  - Team private expertise with public goals (local development + technology transfer)
  - Educate banking sector, set up warranty mechanisms
  - Generate attractive revenues (e.g.: Clean Development Mechanisms)

And now?

Le Tour du monde des Energies (JC Lattès, May 2008).

Conferences and Photo exhibits.
Write-ups on visited projects with help of media partners.

Improve the proposed class material and increase its diffusion.

Start-up : ethanol gel fuel to replace kerosene ?

Elodie Renaud

Engineer at Total
(gas and new energies division)

Blandine Antoine

Civil servant
(Corps Ponts et Chaussées)
+ PhD (MIT + CIRED) :
What impact of globally increased use of biofuels on developing economies?

The future is in our hands

Shoot for the Moon : we'll reach the stars !

www.promethee-energie.org

www.letourdumondedesenergies.com