CARL VON OSSIETZKY universität OLDENBURG

Decoupling

Source: http://www.thegreenmarketoracle.com/2018/05/growth-is-untenable-without-decoupling.html

Outline

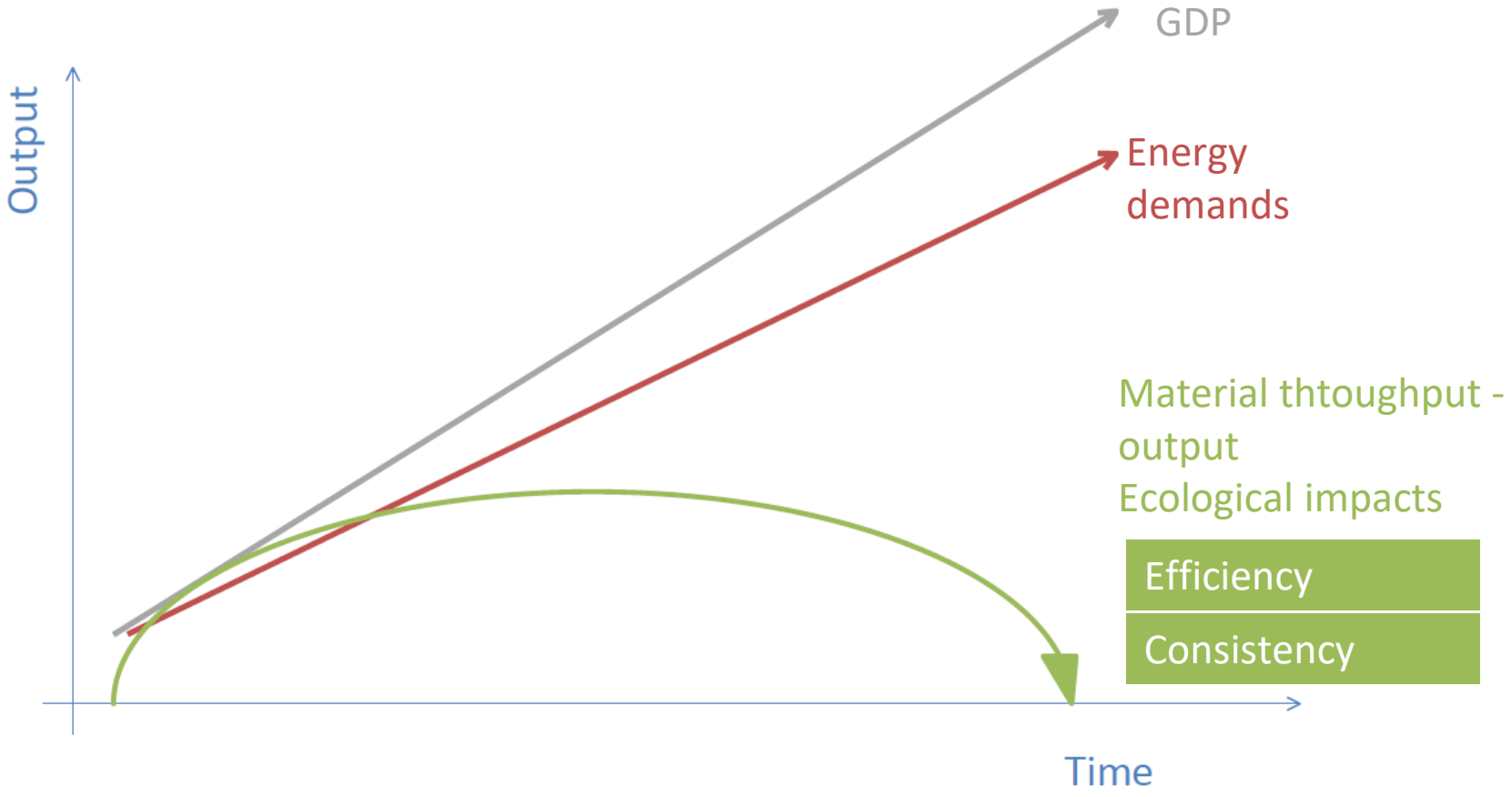
- Decoupling: the concept and its implications
  - Relative decoupling
  - Absolute decoupling

- Wellbeing/development indicators (HDI, HPI, EDI)
  - Behaviour and influencing factors

- Equity and convergence

Decoupling

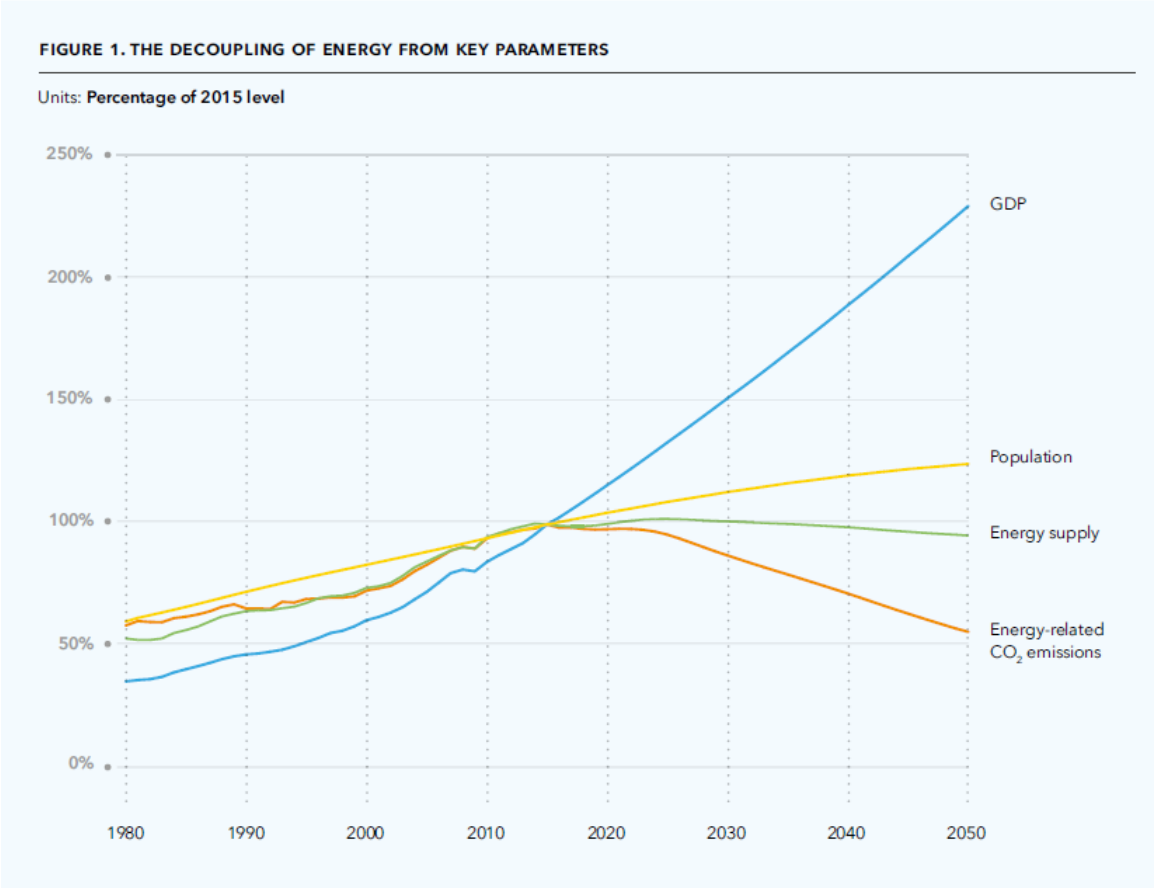
„The conventional response to the dilemma of growth is to appeal to the concept of 'decoupling' " (T. Jackson, 2009, p. 67)



Decoupling

*"World **energy growth** has historically gone hand in hand with population and **economic growth**. Not only will energy decouple from carbon in the coming decades, but, in our view, global energy supply will peak and slowly decline in the context of continued (but slowing) population and economic growth.*

*This is linked to accelerating energy efficiency on a global scale, driven in the main by the growing share of electricity in the energy mix, with losses reduced through the steady uptake of efficient renewable sources". (DNV-GL, **2017**)*

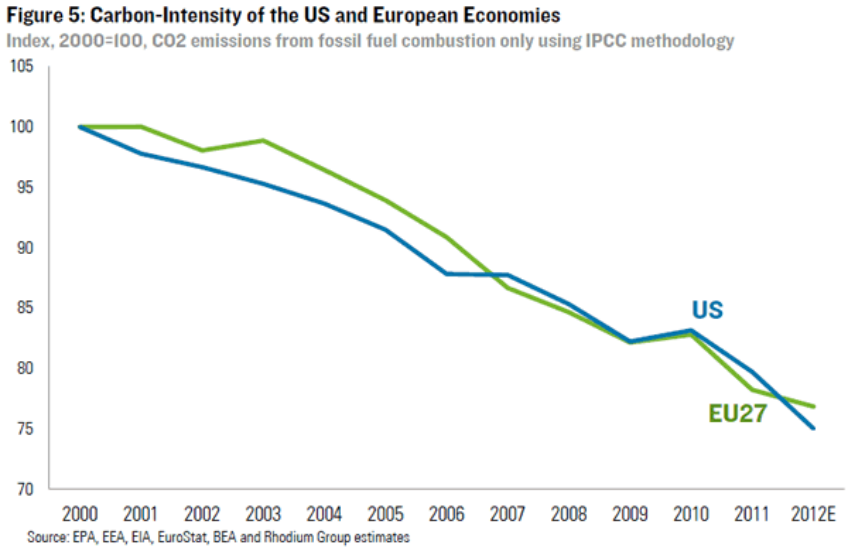


Decoupling

Relative decoupling

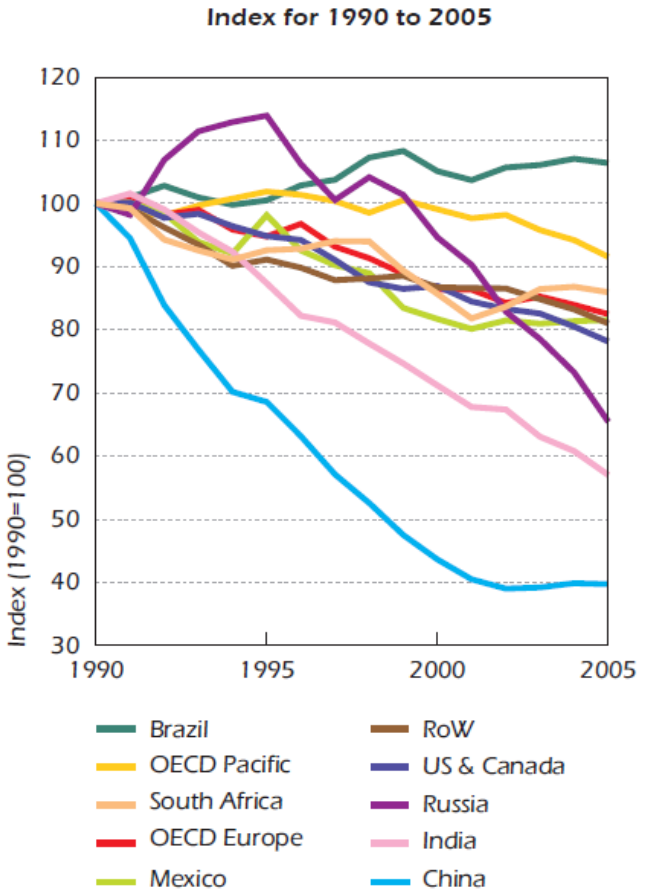
- It works!
- Strong **economic motivation** behind (less production costs)
- Strongly **efficiency-driven**

Carbon intensity



Source: http://rhg.com/wp-content/uploads/2013/05/fig5.gif

Energy intensity



Source: IEA, 2008

Decoupling

Relative decoupling

Carbon intensity:

by regions and over longer time frame

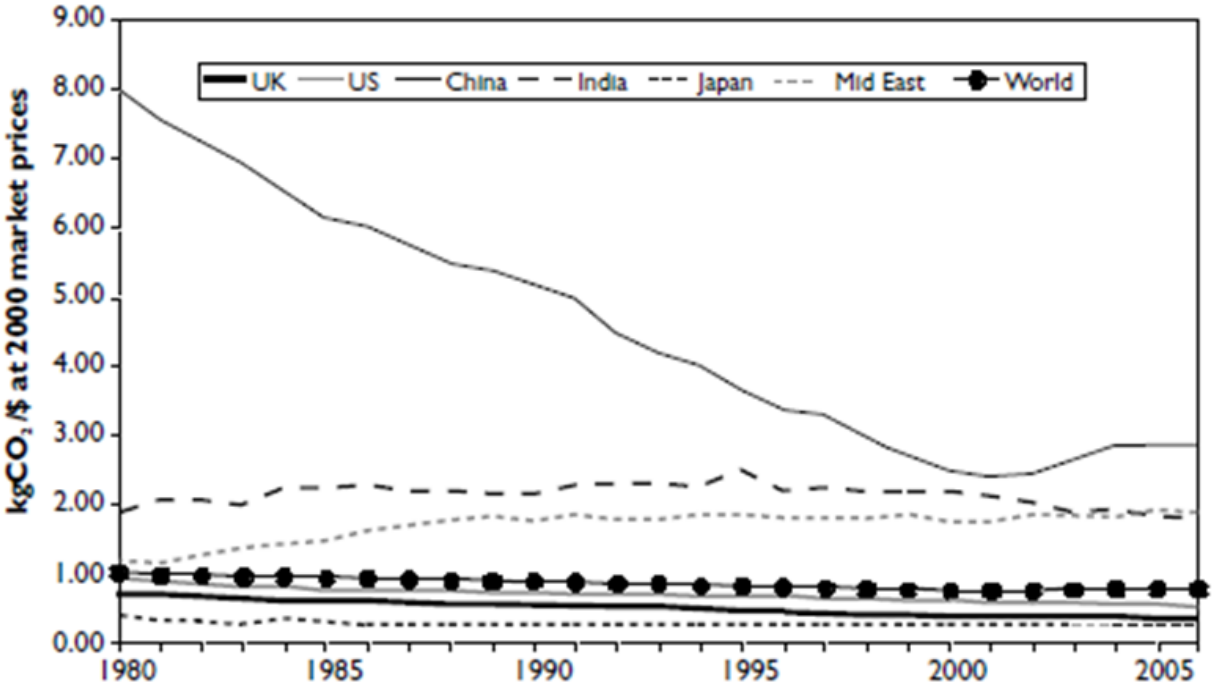


Figure 5.2 CO_2 intensity of GDP across nations: 1980–2006[8]

Source: Jackson, 2009

Decoupling

Absolute decoupling

Quite a different picture!

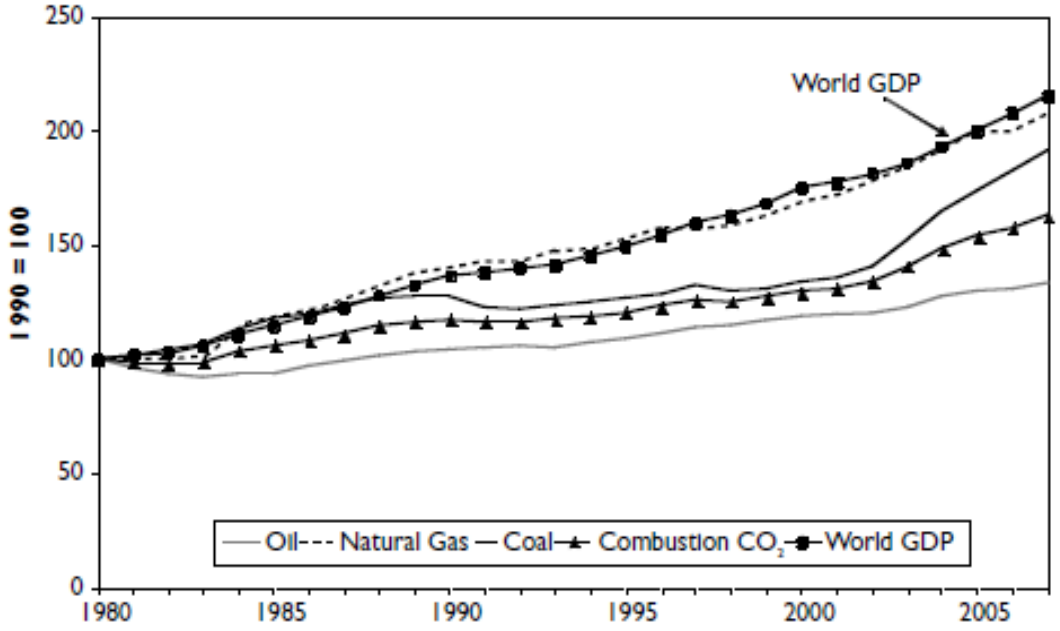


Figure 5.3 Trends in fossil fuel consumption and related CO_2: 1980–2007[9]

Source: see note 9.

Source: Jackson, 2009

Decoupling

Absolute decoupling

Material intensity:

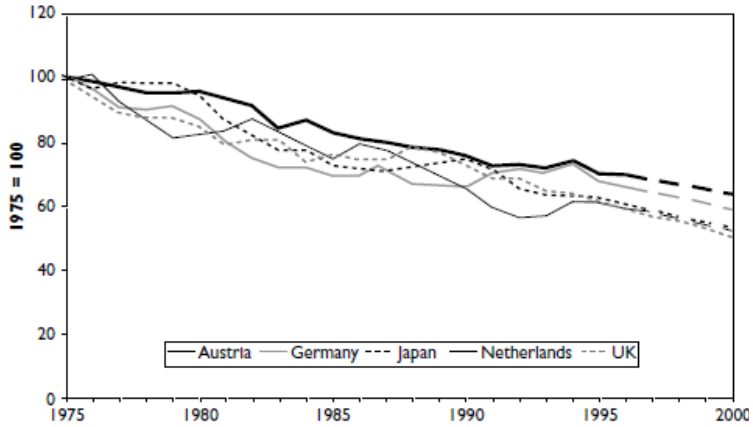


Figure 5.1 Relative decoupling in OECD countries 1975–2000[7]

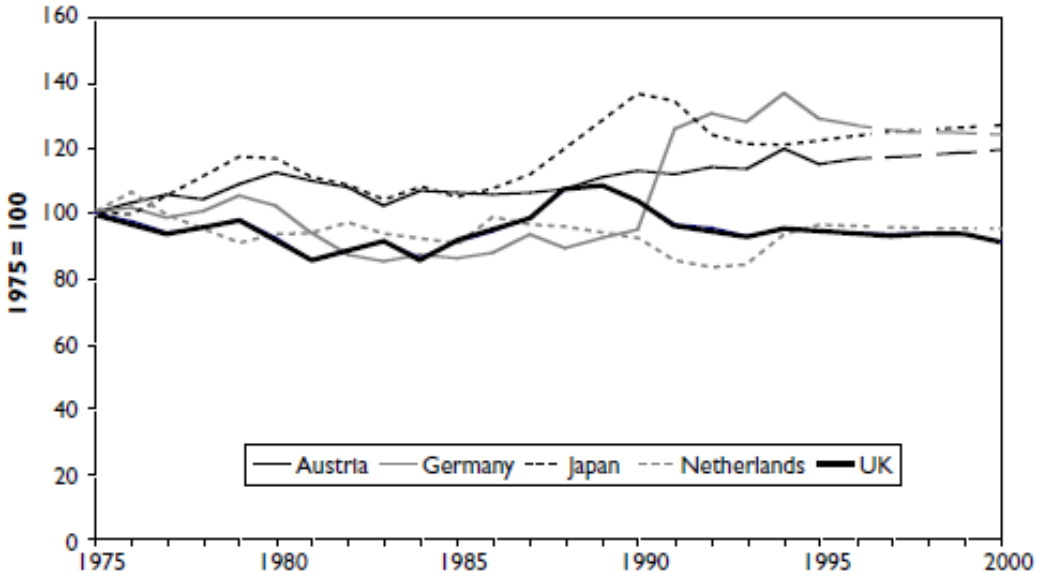


Figure 5.4 Direct material consumption in OECD countries: 1975–2000[10]

Source: Jackson, 2009

Decoupling

Absolute decoupling

Global trends in primary metal extraction

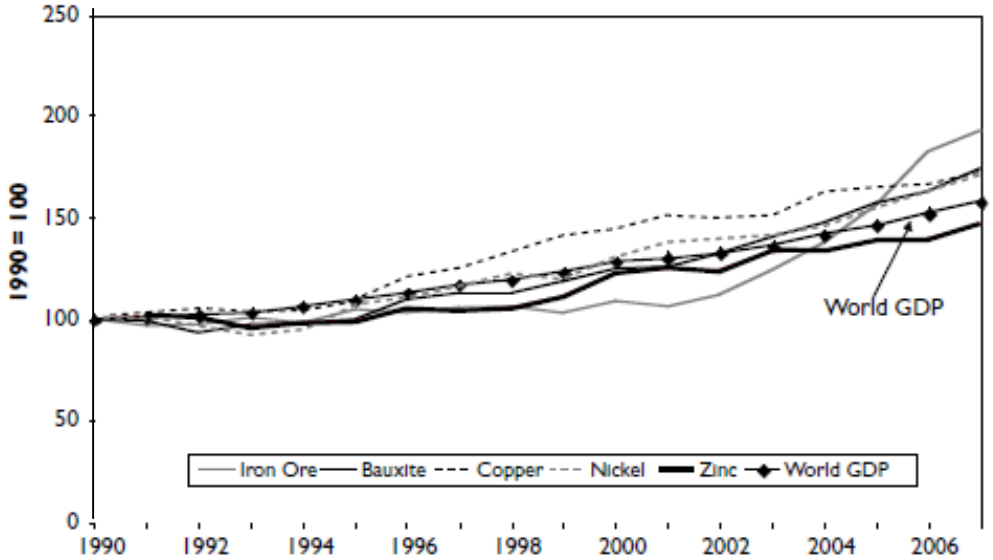


Figure 5.5 Global trends in primary metal extraction: 1990–2007[12]

Source: Jackson, 2009

Decoupling

The arithmetics of decoupling

The Ehrlich Equation

$I = P \times A \times T$

Impact
Production: population
Affluence: income per person (e.g. GDP per capita)
Technology factor: impact per dolar
(e.g. energy or carbon intensity)

Source: Jackson, 2009

Decoupling

The arithmetics of decoupling

The Ehrlich Equation

$I = P \times A \times T$

Impact
Production: population
Affluence: income per person (e.g. GDP per capita)
Technology factor: impact per dolar
(e.g. energy or carbon intensity)

T, Relative decoupling: Necessary! But needs to decrease faster than the increase in **P** or **A** to produce absolute decoupling!!!

Source: Jackson, 2009

Decoupling

The arithmetics of decoupling

The Ehrlich Equation

$I = P \times A \times T$

Impact
Production: population
Affluence: income per person (e.g. GDP per capita)
Technology factor: impact per dolar
(e.g. energy or carbon intensity)

Absolute figures for the variables

Relative decoupling: Necessary! But needs to decrease faster than the increase in **P** or **A** to produce absolute decoupling!!!

$dI = dP + dA + dT$

Growth rates figures for the variables

Source: Jackson, 2009

Decoupling

The arithmetics of decoupling

The Ehrlich Equation

$I = P \times A \times T$

Impact
Production: population
Affluence: income per person (e.g. GDP per capita)
Technology factor: impact per dolar
(e.g. energy or carbon intensity)

Necessary! But needs to decrease faster than the increase in **P** or **A** to produce absolute decoupling!!!

Example: Current carbon intensity growth rate = **-1,3%** (relative decoupling achieved!)

Population growth = +0,7%; **A**ffluence = +1.4% (GDP per capita);
(Target) **I** = **- 4,9%** (to achieve 450 ppm in 2050 (IPCC))
-> Required T (carbon intensity) = ??

Source: Jackson, 2009

Decoupling

The arithmetics of decoupling

The Ehrlich Equation

$I = P \times A \times T$

Impact
Production: population
Affluence: income per person (e.g. GDP per capita)
Technology factor: impact per dolar
(e.g. energy or carbon intensity)

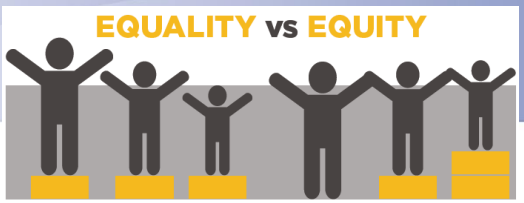
Necessary! But needs to decrease faster than the increase in **P** or **A** to produce absolute decoupling!!!

Example: Current carbon intensity growth rate = **-1,3%** (relative decoupling achieved!)

Population growth = +0,7%; **A**ffluence = +1.4% (GDP per capita);
(Target) **I** = **- 4,9%** (to achieve 450 ppm in 2050 (IPCC))
-> Required T (carbon intensity) = -7%

Source: Jackson, 2009

Source: www.washingtongrantmakers.org/racial-equity



Decoupling

The arithmetics of decoupling…. And EQUITIY issues!

The Ehrlich Equation $I = P \times A \times T$

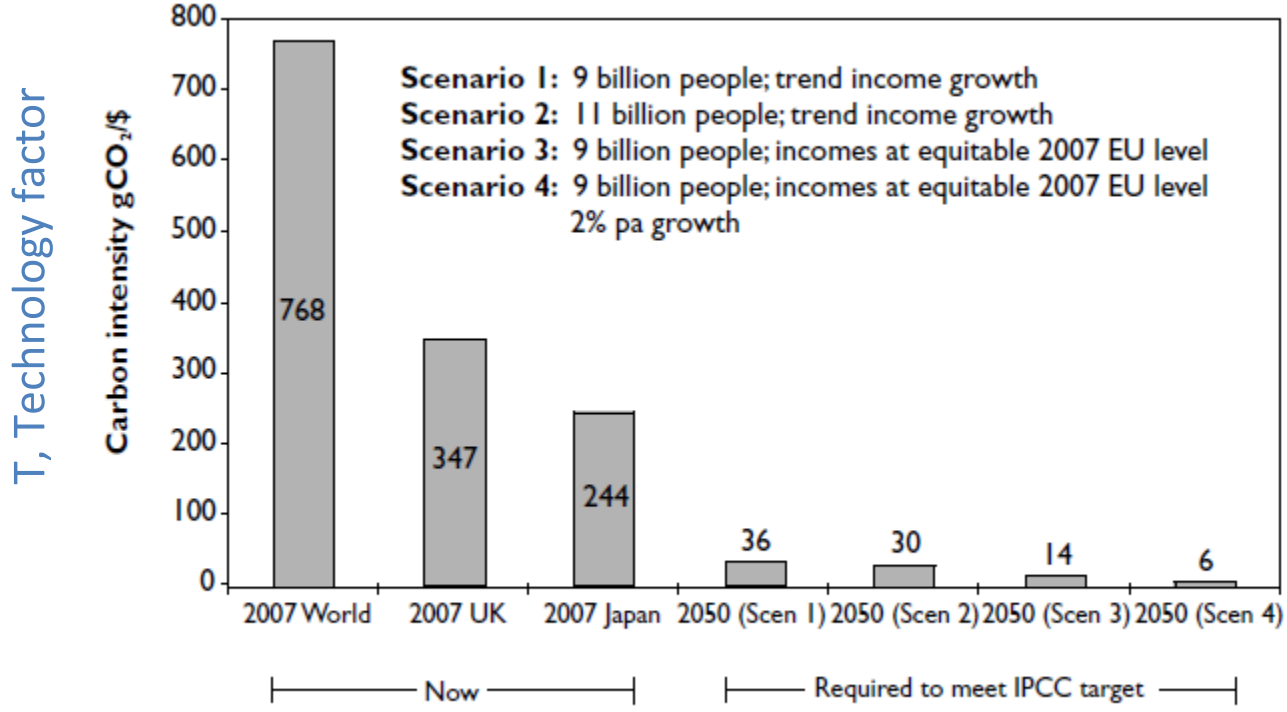


Figure 5.6 Carbon intensities now and required to meet 450 ppm target[25]

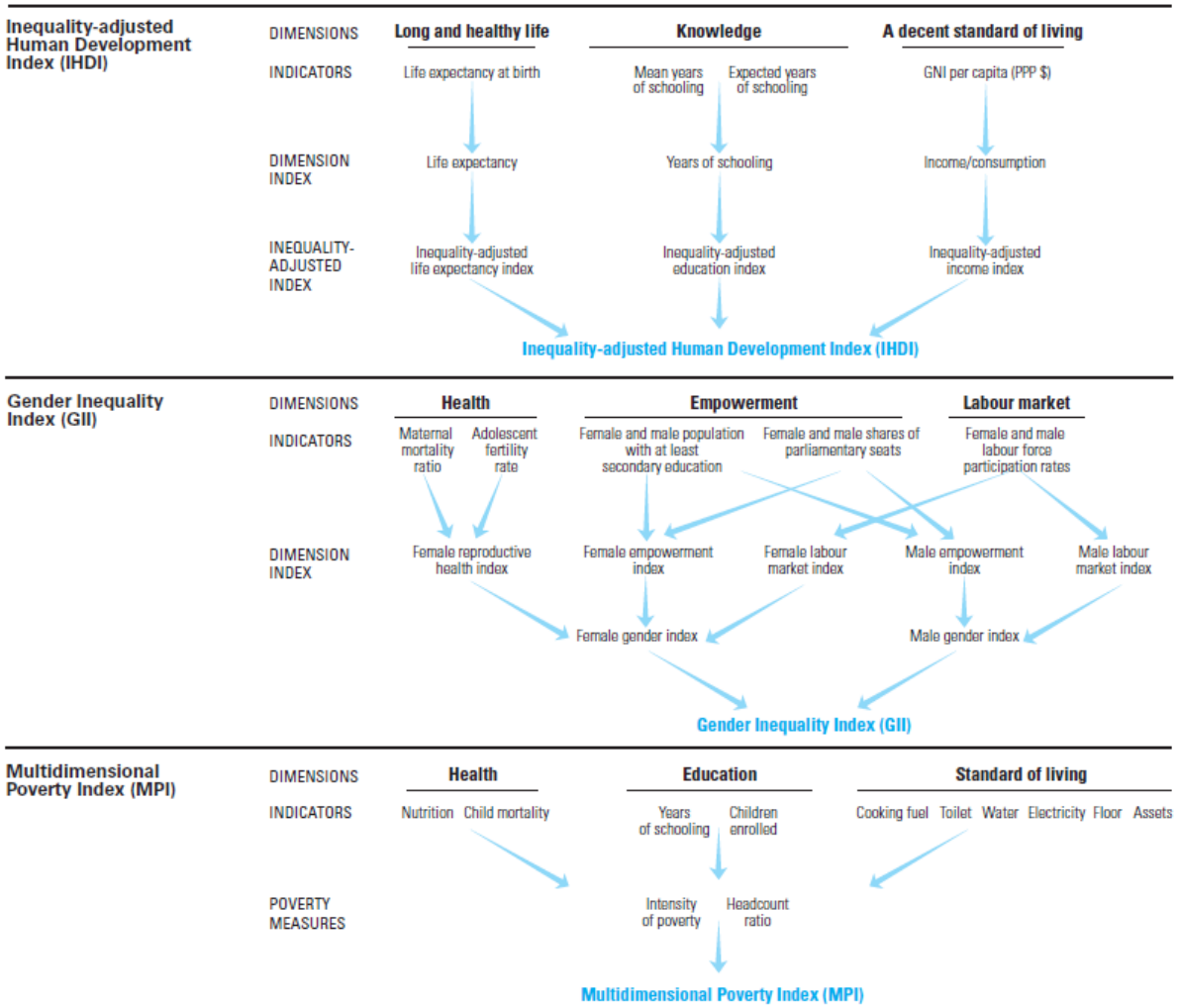
Source: Jackson, 2009

Wellbeing indicators

The arithmetics of … EQUITIY?

Source: UNDP, 2013

Equity = GDP??



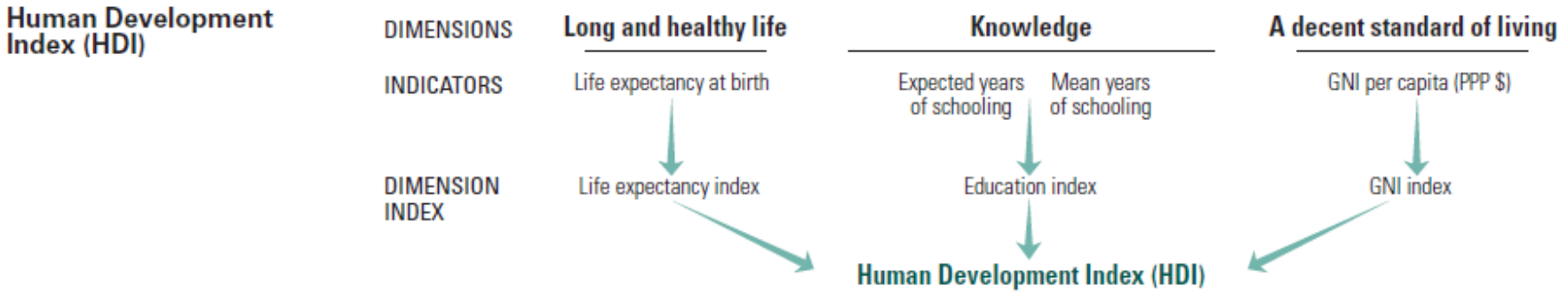
Wellbeing indicators

The arithmetics of … EQUITIY?

Equity = GDP??

Human Development Index

Source: UNDP, 2013

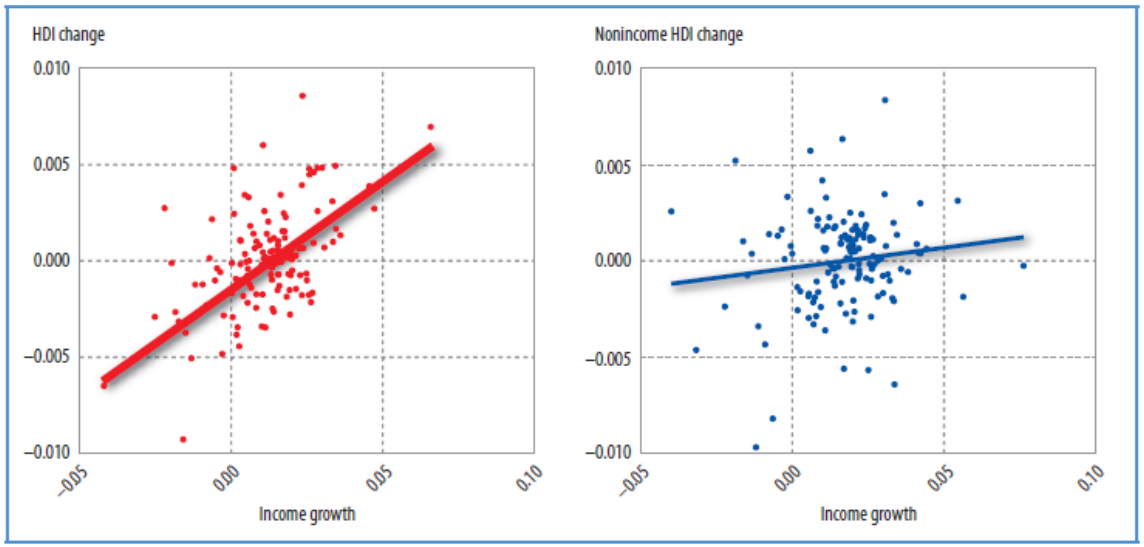


Source: UNDP, 2010

Wellbeing indicators

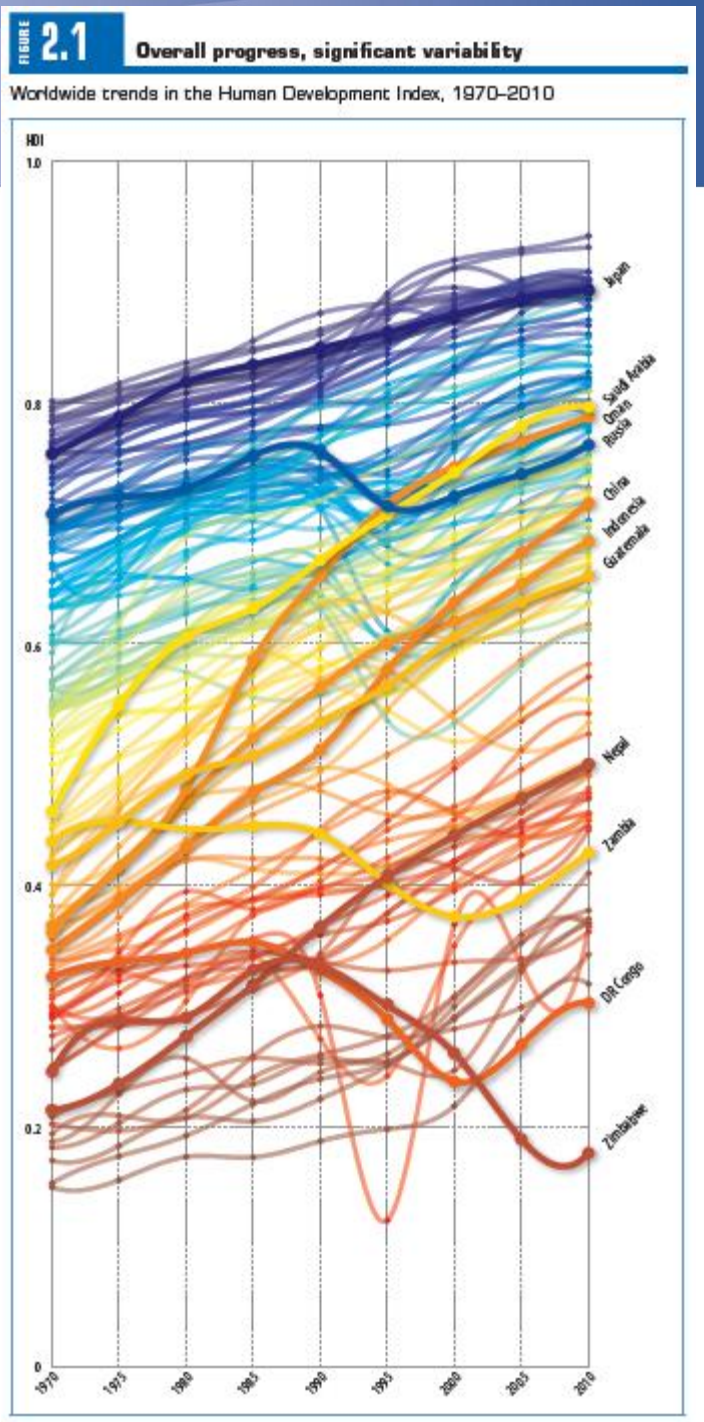
Influencing factors

Relationship between economic growth and the HDI and its nonincome components, 1970–2010



Note: Based on the analysis of deviation from fit (see box 2.1 in chapter 2 and *Technical note 1*). Income is per capita GDP. Thicker regression line indicates relationship is statistically significant.

„In a 1999 article, *Life during Growth*, William Easterly found a remarkably weak association between growth and quality of life indicators such as health, education, political freedom, conflict and inequality“ (UNDP, 2010)



Source: UNDP, 2010

Wellbeing indicators

Influencing factors

Relationship between inequality in health, education and income and HDI levels, 2010

Note: The percentage loss associated with inequality in each dimension is defined in chapter 5. See *Technical note 2* for details on measuring multidimensional inequality.

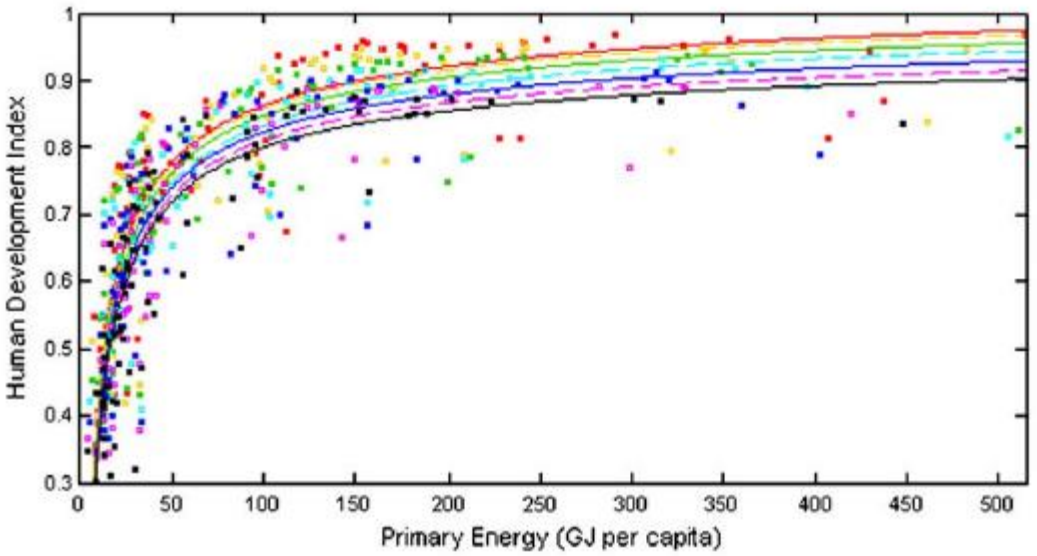
Source: HDRO calculations using data from the HDRO database.

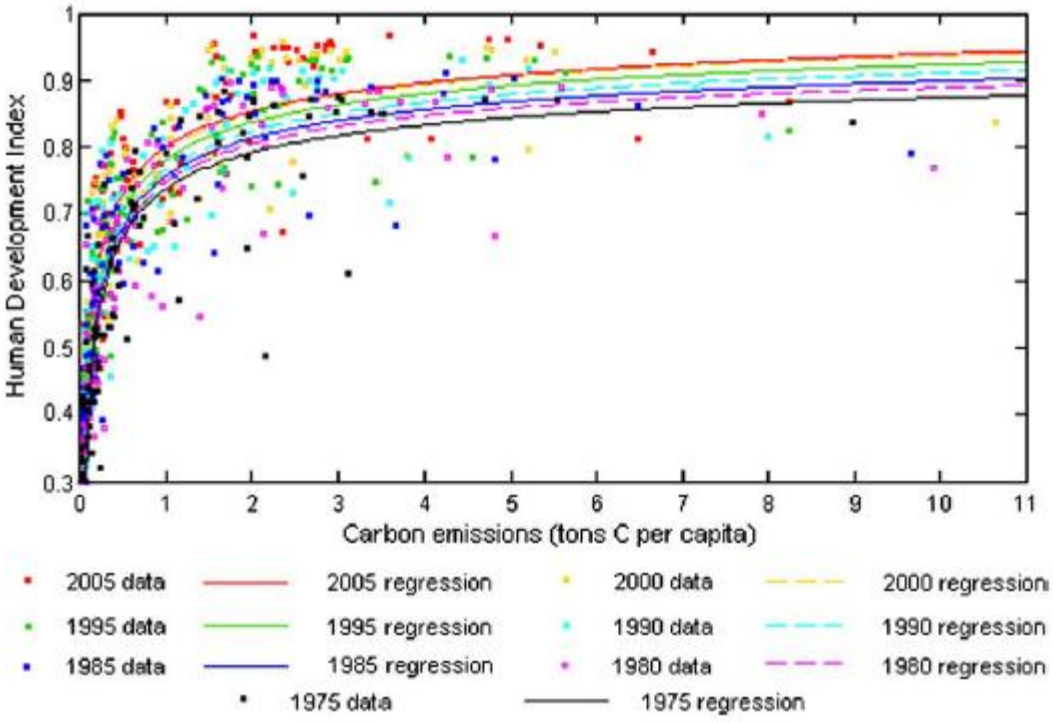
„In a 1999 article, *Life during Growth*, William Easterly found a remarkably weak association between growth and quality of life indicators such as health, education, political freedom, conflict and inequality“ (UNDP, 2010)

Source: UNDP, 2010

Wellbeing indicators

Influencing factors



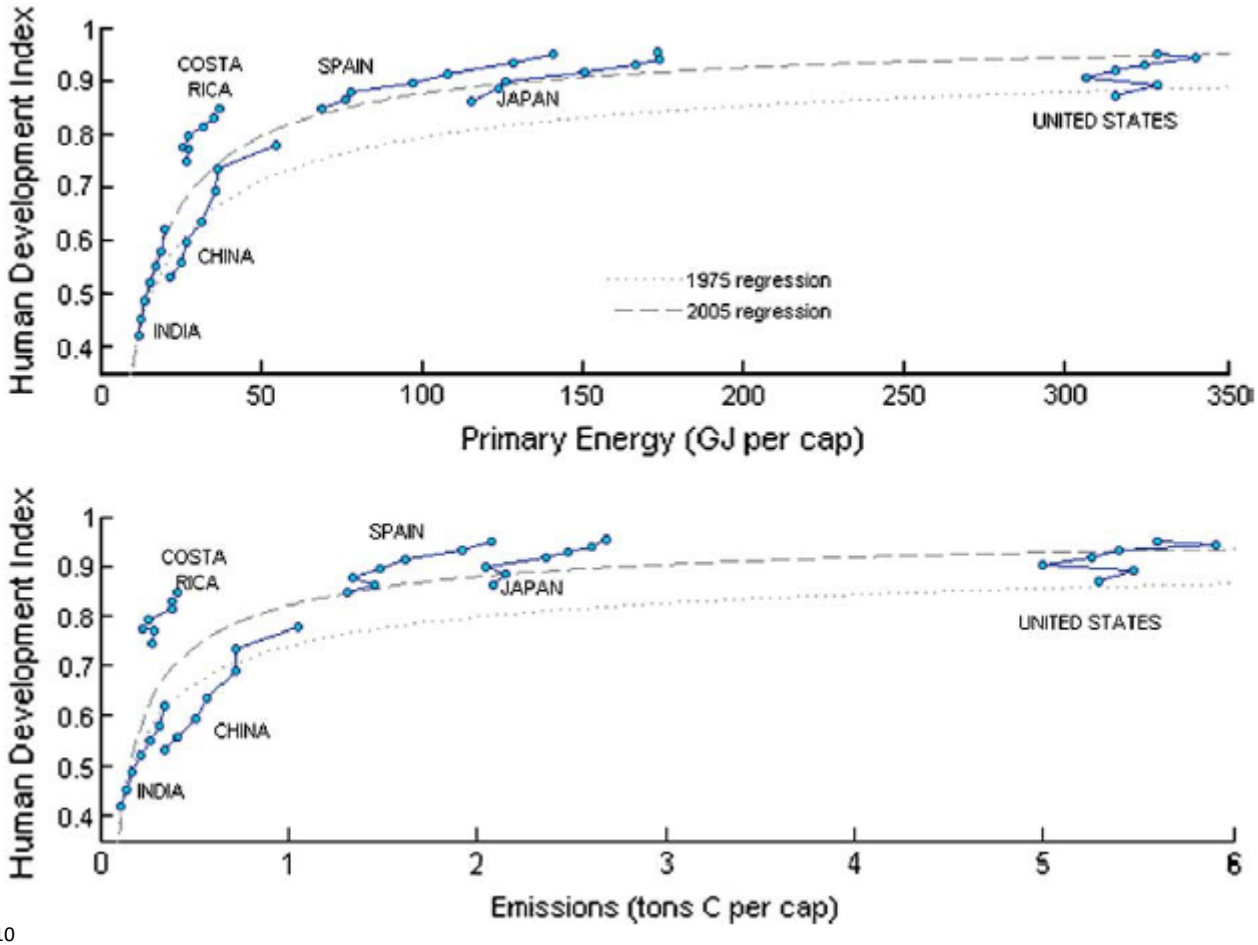


Source: Steinberger and Roberts, 2010

Source: UNDP, 2010

Wellbeing indicators

Influencing factors



Source: Steinberger and Roberts, 2010

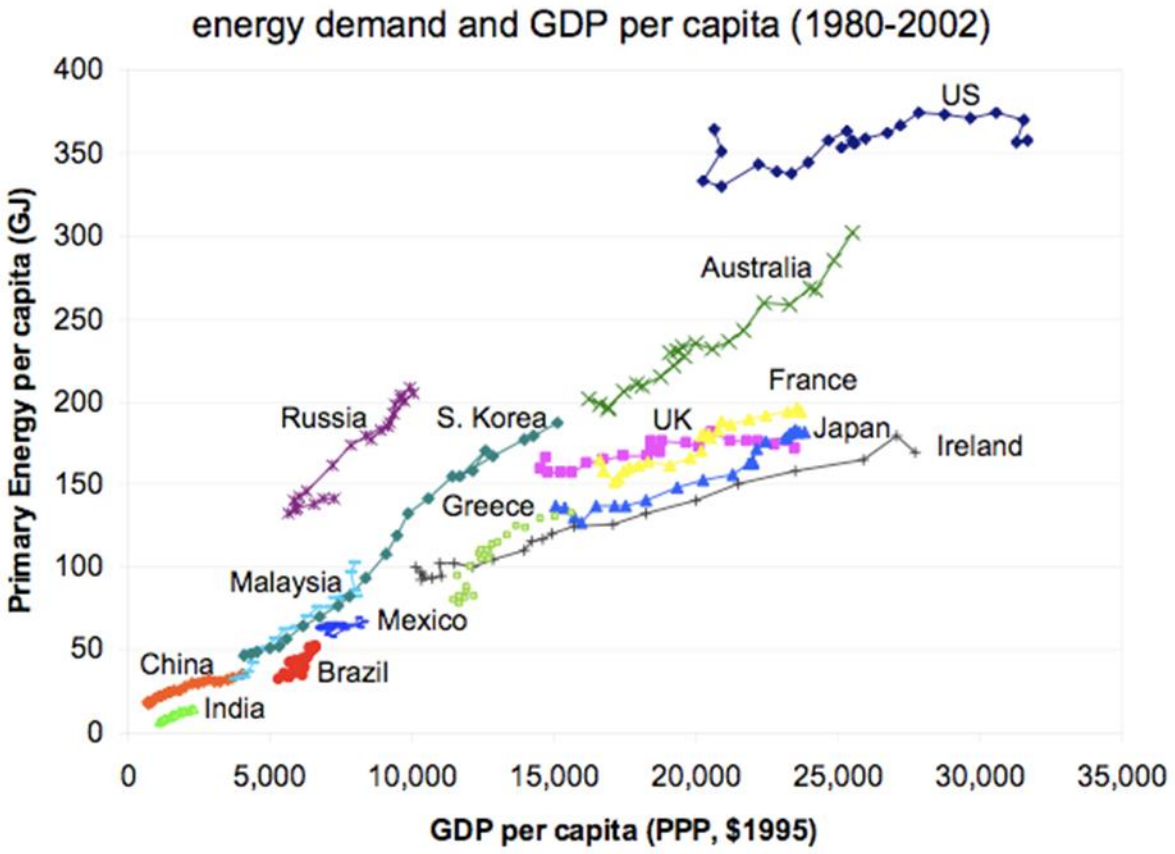
Source: UNDP, 2010

Wellbeing indicators

Influencing factors

GDP as „resource intensive“!

Source: www.theoildrum.com



Source: UN and DOE EIA

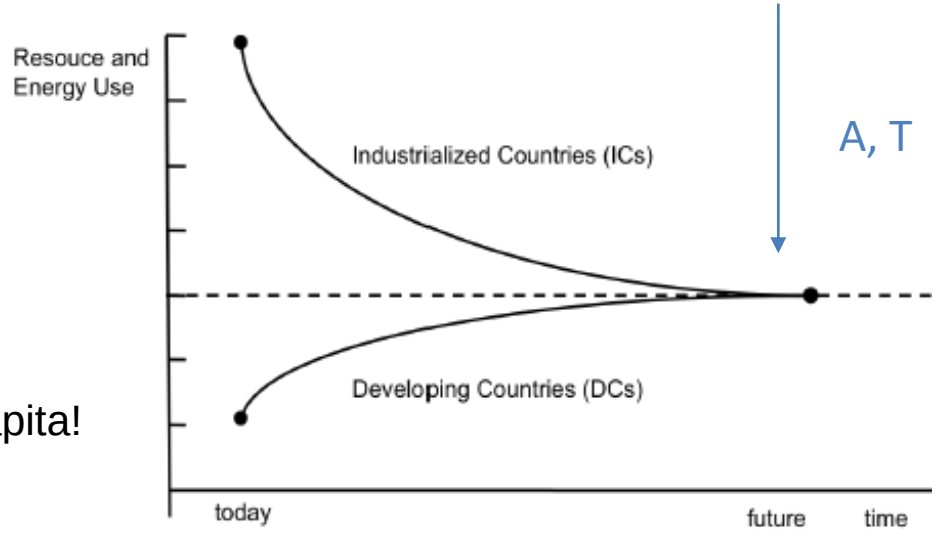
Source: UNDP, 2010

Wellbeing indicators

I = P x A x T

Influencing factors

GDP as „resource intensive“! -> reduction and convergence



Source: Hennicke. 2014

- World average energy consumption:
  70 GJ/cap/a
  Currently GER≈ 162 GJ/cap/a
- ≈ 1/3 of EU energy consumption per capita!

≈ 2000W/cap (ca. 65GJ/cap/a)

- Compatible with the carrying capacity of biosphere
- Implies a factor 4 increase in energy and material efficiency -> factor 4 decrease in T

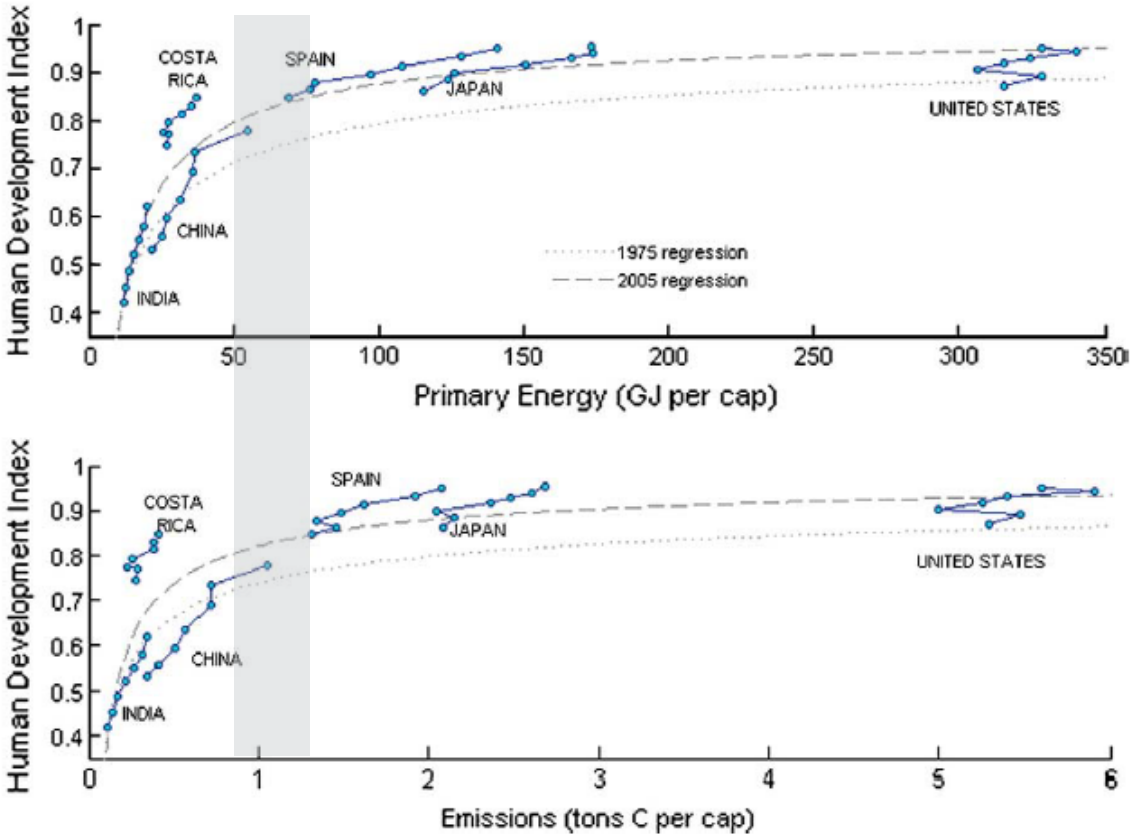
Source: UNDP, 2010

Wellbeing indicators

I = P x A x T

Influencing factors

GDP as „resource intensive“! -> reduction and convergence



Source: Steinberger and Roberts, 2010

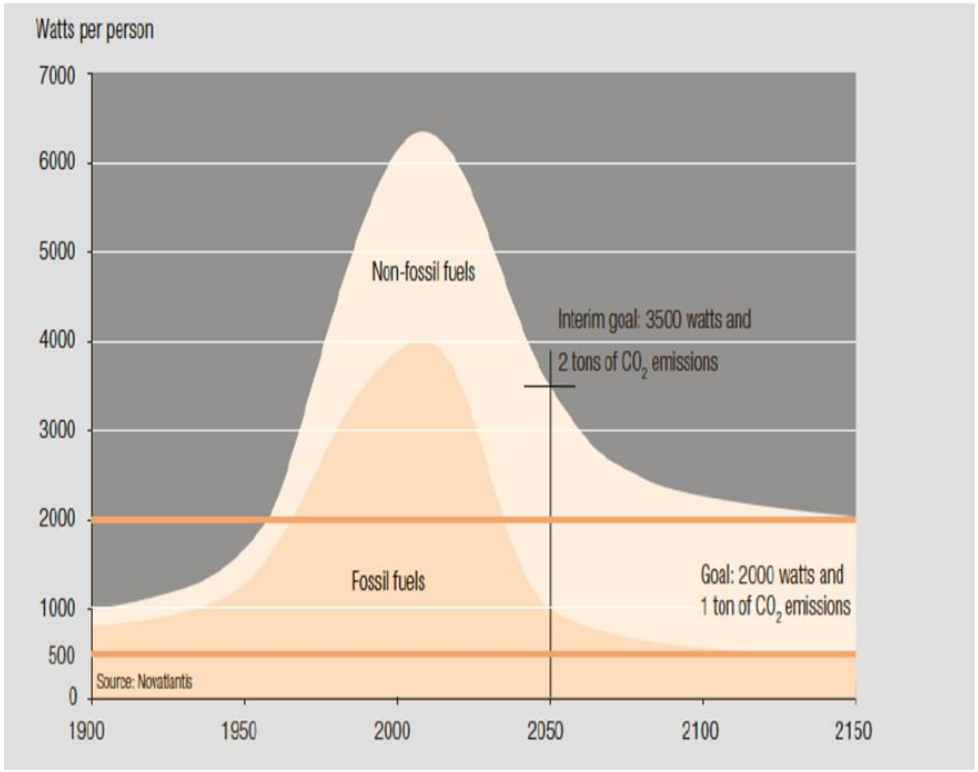
Source: UNDP, 2010

Wellbeing indicators

I = P x A x T

Influencing factors

GDP as „resource intensive“! -> reduction and convergence



Stadt Zürich
Umwelt- und Gesundheitsschutz

On the way to the 2000-watt society

Zurich's path to sustainable energy use

On 30 November 2008, the City of Zurich made a ground-breaking decision. Over three quarters of the electoral roll voted in favour of Zurich doing the following:

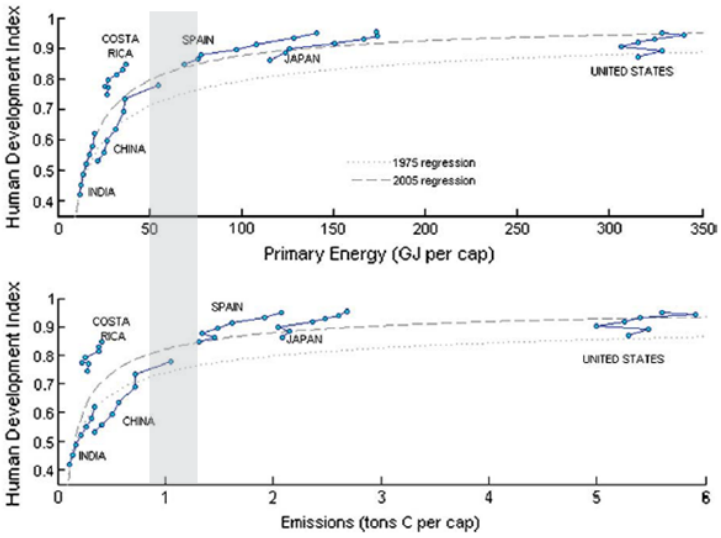
- Committing to sustainable development.
- Reducing its energy consumption to 2000 watts per person.
- Reducing its annual CO_2 emissions to one tonne per person by 2050.
- Promoting renewable energies and energy efficiency.
- Not renewing its investments in nuclear power plants.

With this strategy, Zurich wants to contribute to combating human-induced climate change, but there are also social, economic and ethical arguments which speak in favour of lower energy consumption. As a 2000-watt society, Zurich is better equipped for times of scarce and expensive energy resources, but the fact that the goals are set in the municipal code does not mean that they have yet been achieved. This requires effort on the part of the city administration, the residents and the local economy, but also good cooperation with political bodies at higher levels, namely the canton and

Source: Hennicke. 2014

Source: UNDP, 2010

Transfer to mobility



Source: Steinberger and Roberts, 2010

T decrease
A decrease?

Related questions:

- How energy intensive is mobility in Germany (T-factor)?
- What is the interdependence between personal mobility and GDP in Germany?
- What would be the current A factor?
- What would be the equivalent to a convergency at 2000W for mobility in Germany? How would the T (and possibly A) factor(s) look like for it?

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