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Water in the City of the Future

A Vision on Water for Healthy People and a Healthy Environment

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UNESCO



Green Building Conference, Jakarta, 8 - 9 May, 2014



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What's in a name?

Green buildings



Green cities

Eco-cities

Sustainable cities



Green economy





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We live in a world that is alarmingly out of balance

Severe imbalance between **people and planet earth**
The persistent imbalance **between people**





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Imbalance Between People

**The 50%-
poorest people
own 1% of
global wealth**

**The 1%-
richest people
own 40% of
global assets**

Women earn only 10% of global income

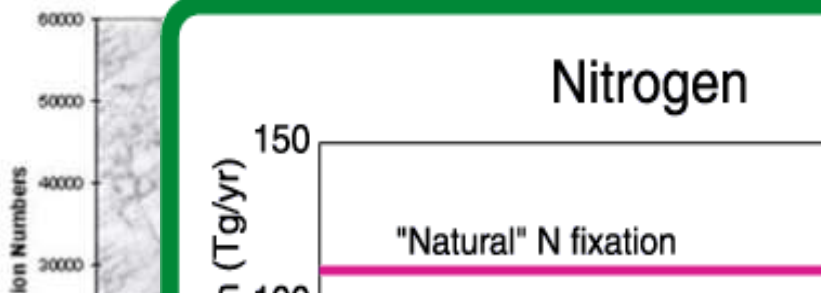


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Imbalance between people and planet

Global Change is more than Global Climate Change

Species Extinction and Human Population



Nitrogen

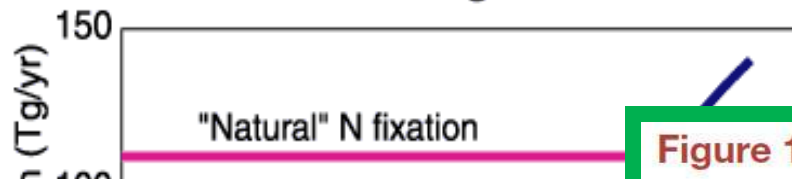
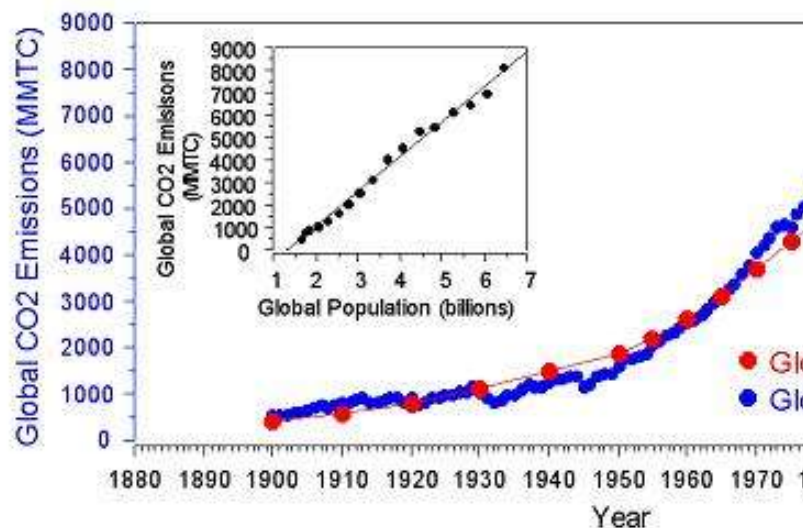
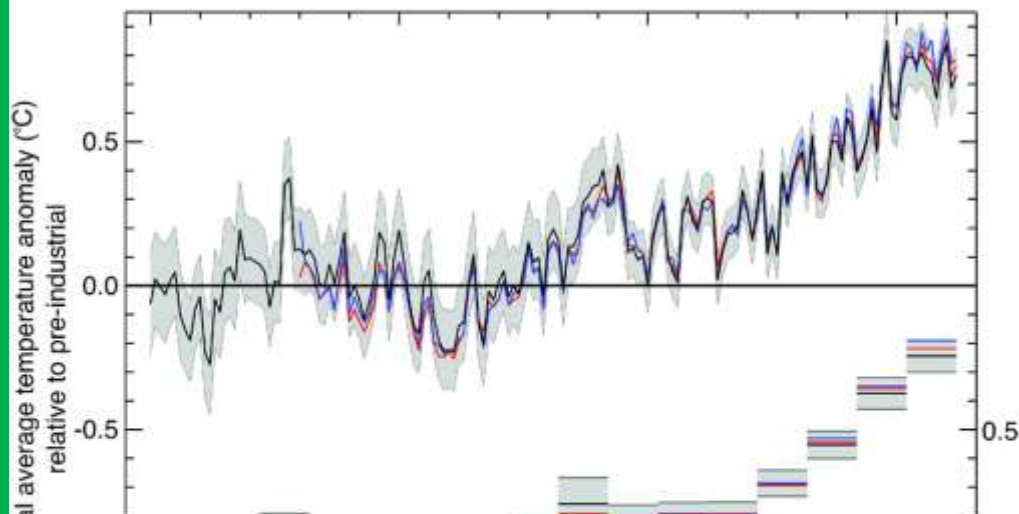


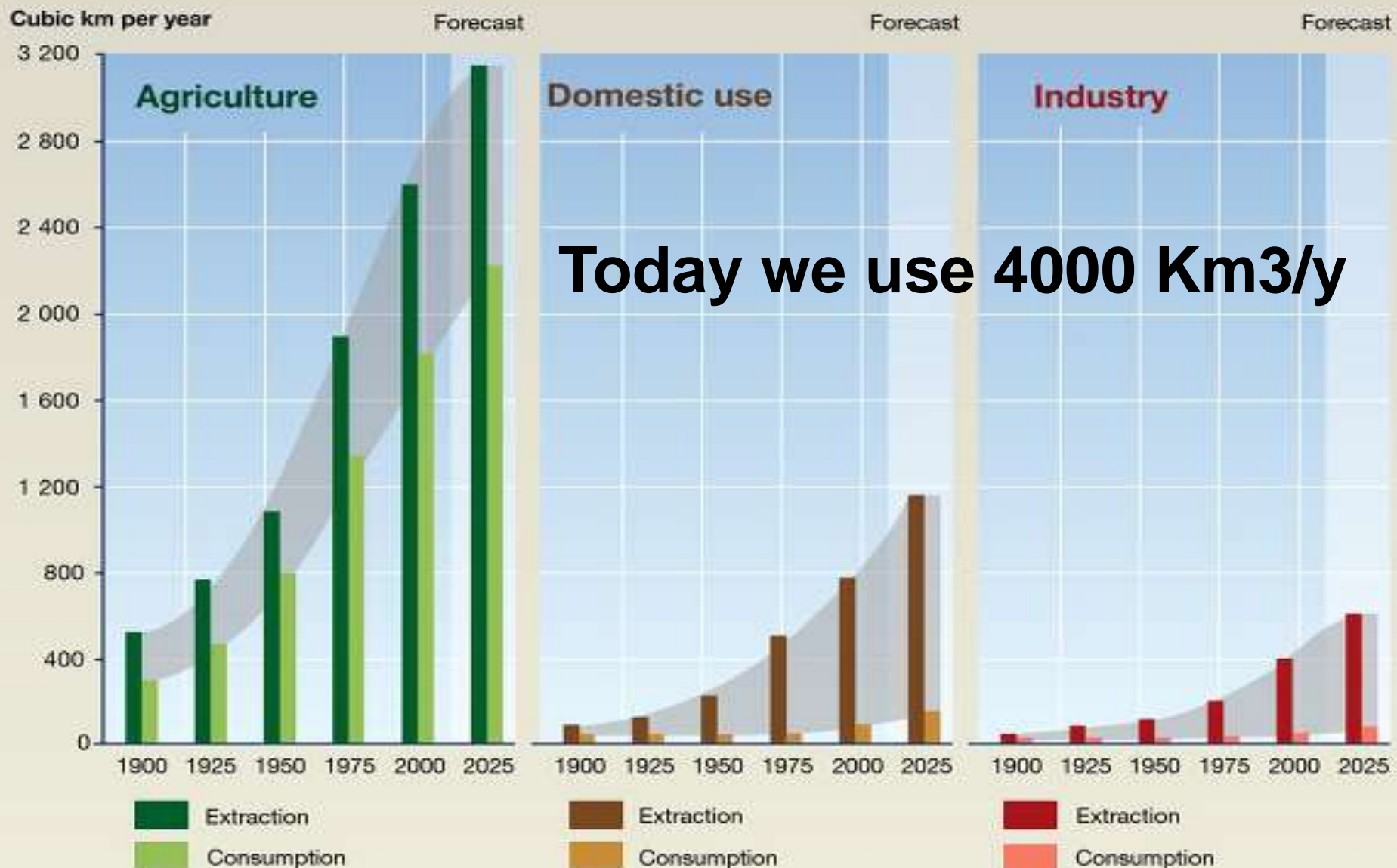
Figure 1: World population and cumulative deforestation, 1800 to 2010



Global Temperatures (1850-2012)

annual average and 10-year average







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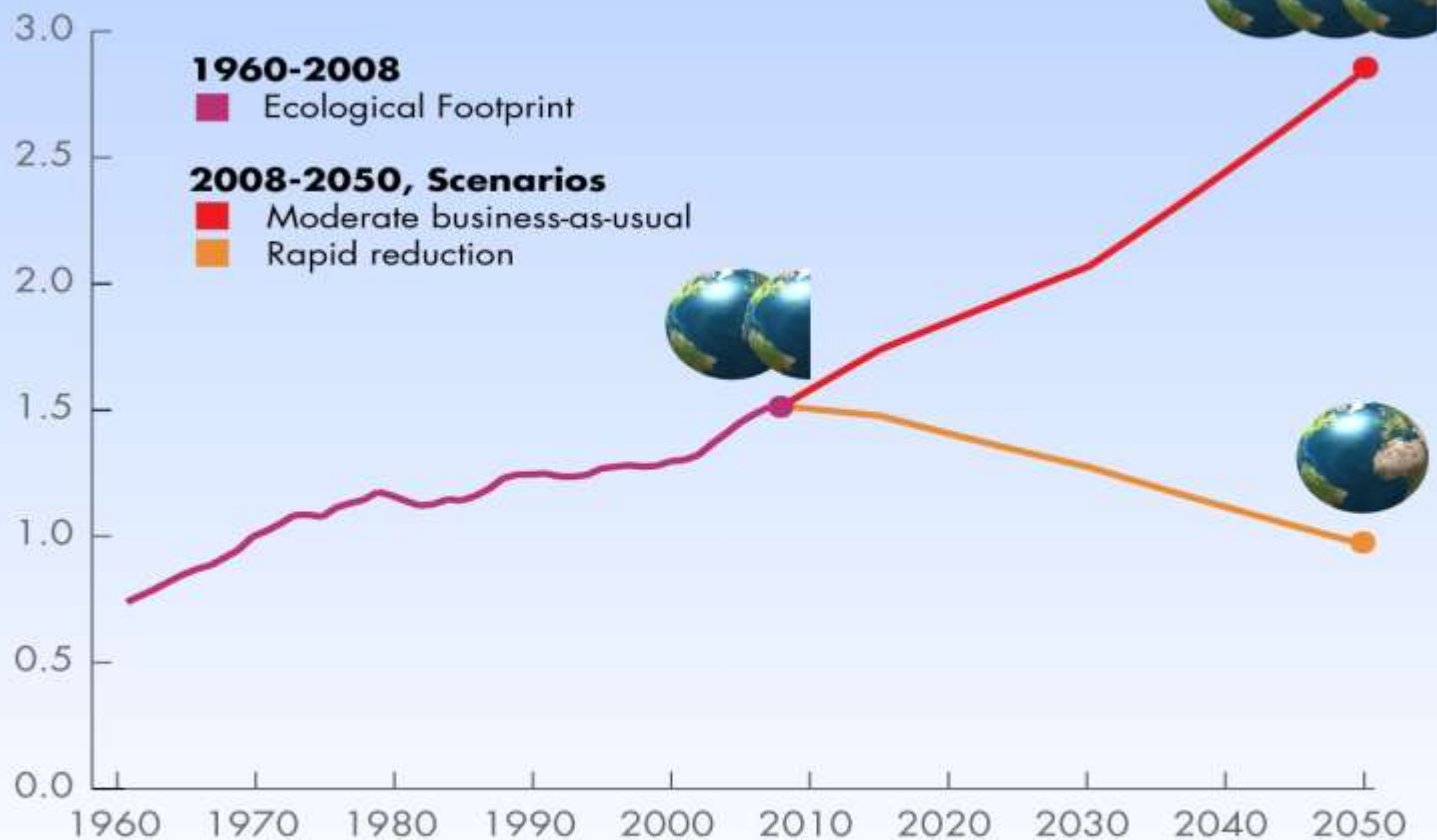
200 years of global development (1813 – 2013)

	1813	2013	increase
Population (billion)	1	7	7x
GDP (billion US\$)	180	74,500	400x
GDP (US\$/Capita)	180	11,900	65x
Primary energy	12	540	45x
CO2 emission (billion tons)	1.8	36	20x
Mobility (km/ppd)	0.05	50	1000x
Urbanisation rate	2%	>50%	25x



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Ecological Footprint

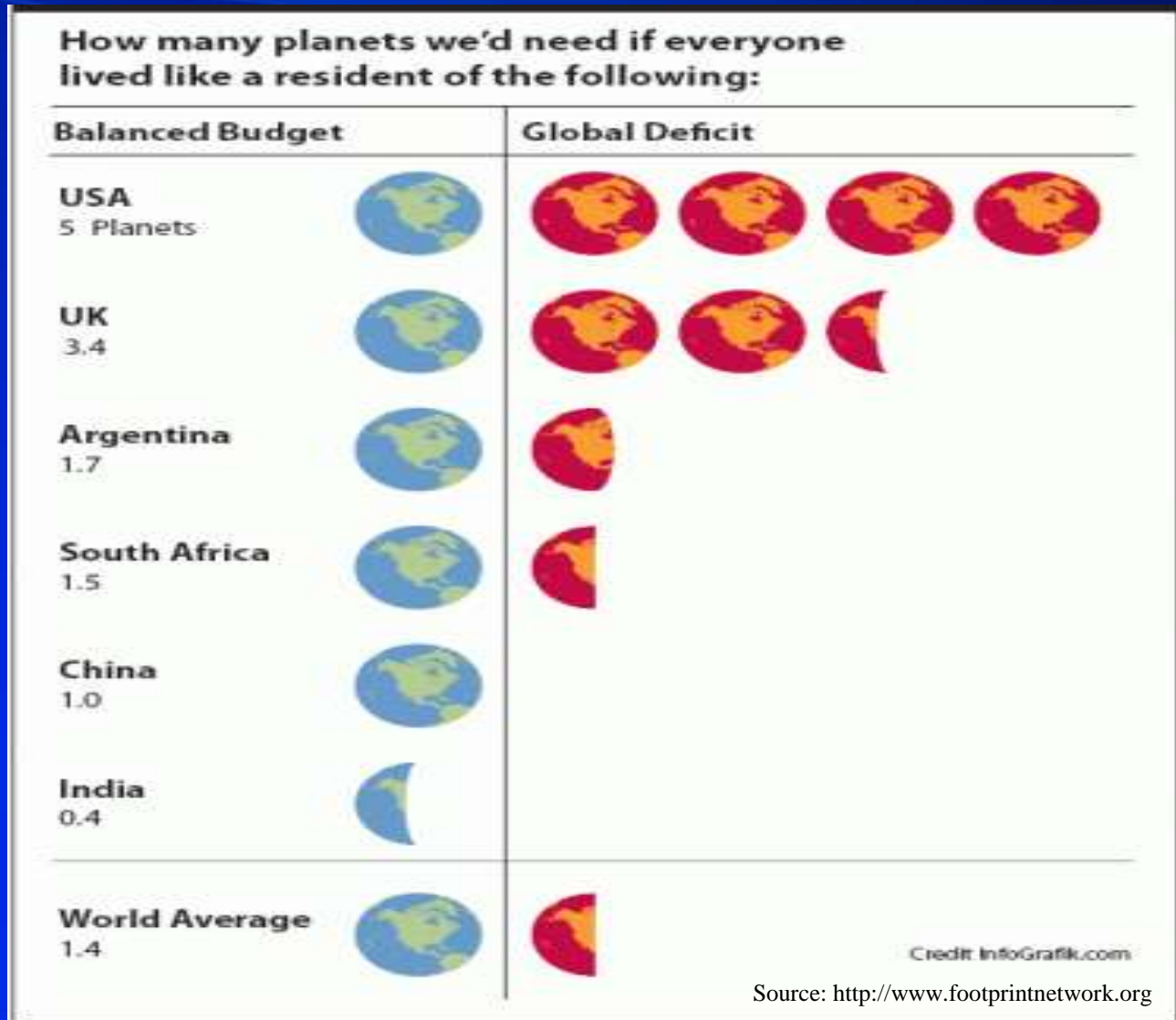


y-axis: number of planet earths, x-axis: years

Source: <http://www.footprintnetwork.org>



People – Planet Imbalance

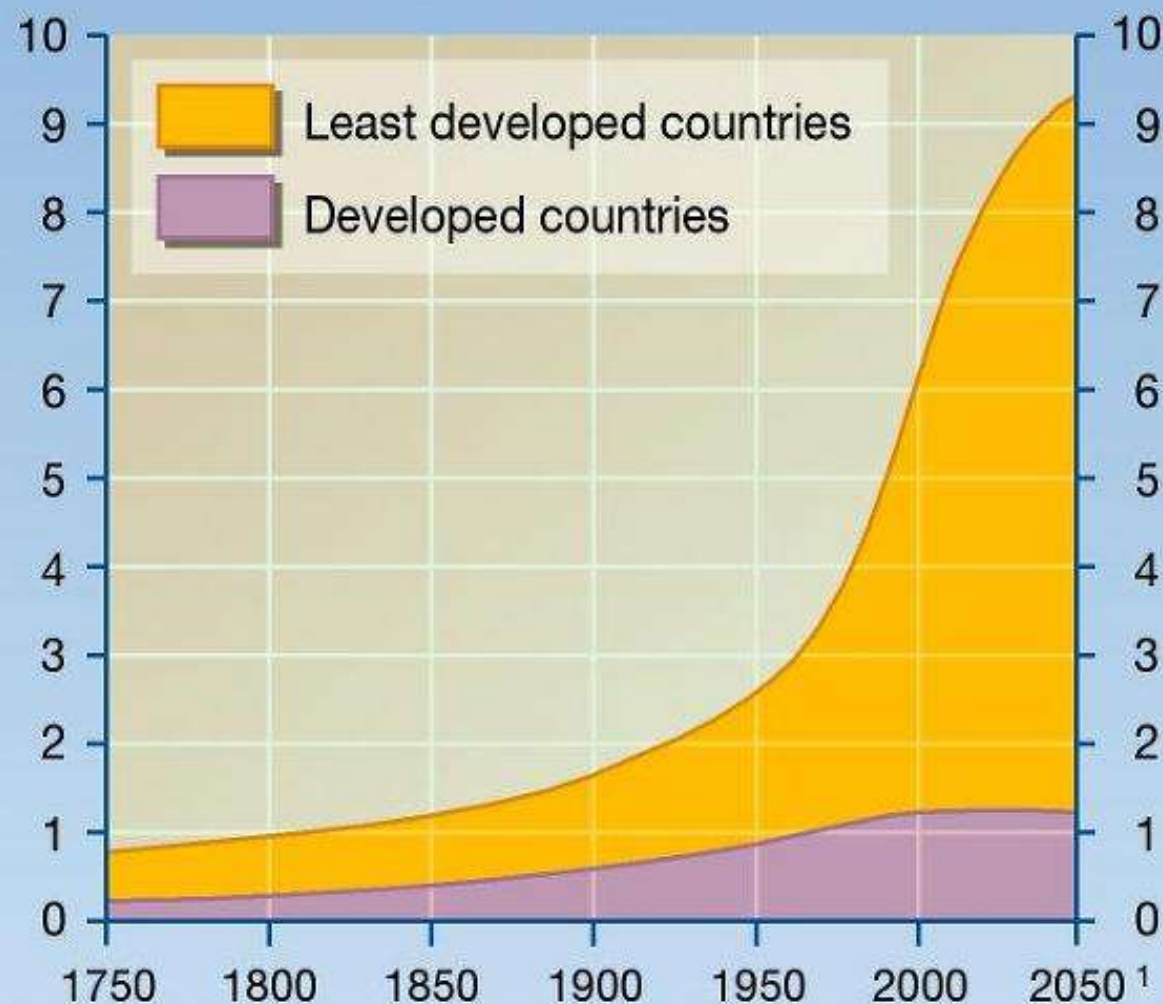




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People are central in the people/planet equation

Billion human beings



1. According to the medium hypothesis of the United Nations.

Sources: *World Population 1998, The World at Six Billion* (October 1999) et *World Population Prospects: The 2006 Revision* (February 2007), United Nations, department of social and economics affairs, population division New York.



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A Defining Moment in Time

MDGs



2015

Post-2015 Agenda

**The future
we want for all**

2000

2015

2030

2050



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10 Key Global Challenges

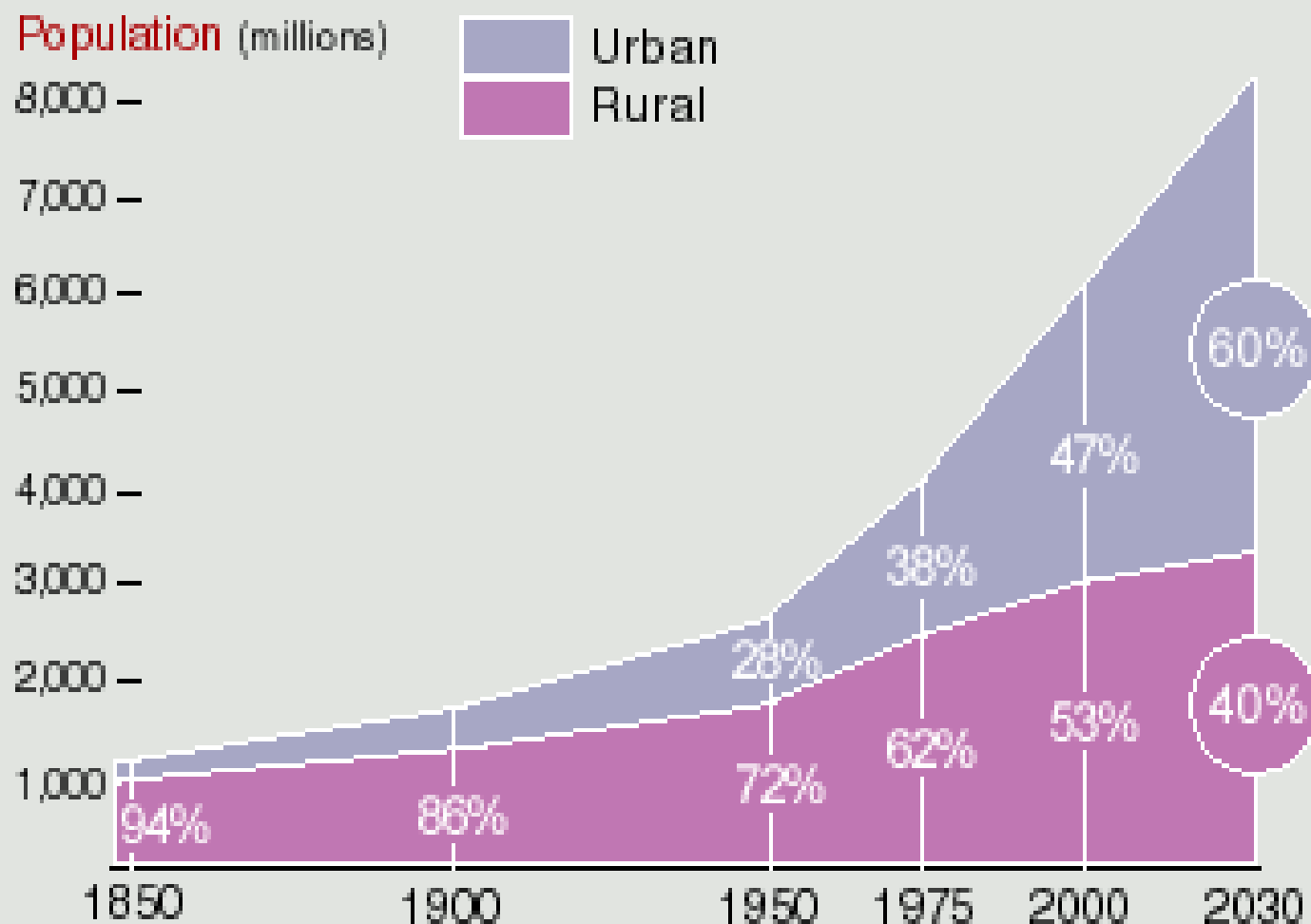
- Poverty eradication
- **Pollution**
- Population growth **and urbanization**
- Food security and **sustainable production**
- Old and **New diseases**
- **Energy**
- **Disasters**
- **Water and environmental resources**
- **Climate change**
- **Peace and security**





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Trends in World Urbanisation



Source: U.N. *World Population Prospects*

The specific picture





The big picture

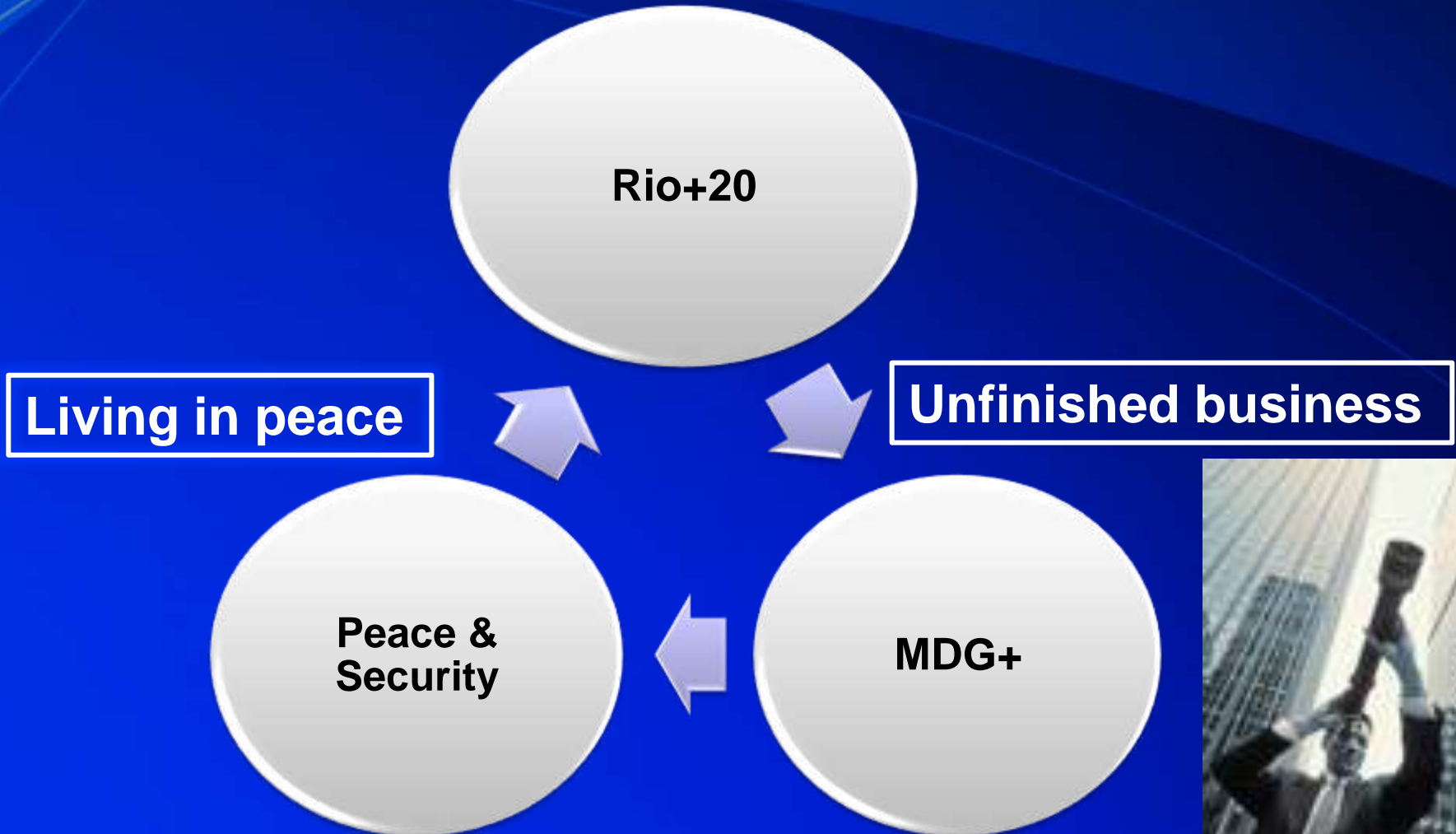


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Post-2015 UN Agenda

Convergence of three main agendas

Towards SD and a Green Economy





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Inter-connected complex challenges

**Water, food and energy are at the heart
of Sustainable Development**





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Transformative Shifts

Three main sectors of concern:

- Energy
- Water
- Food





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Transformative Shifts

Managing these 3 key issues will help resolve related issues, such as:

- **Climate change**
- **Biodiversity loss**
- **Rebalancing C, N, P cycles**
- **Ocean acidification**
- **Water management**





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Transformative Shifts

We need:

- **New energy**
- **New water**
- **New food**





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Vision2050

We need a long term vision of a sustainable world in which, by mid-century, 9 billion people can live a decent quality of life within the planet's limited resources





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The Power of Imagination



imagine





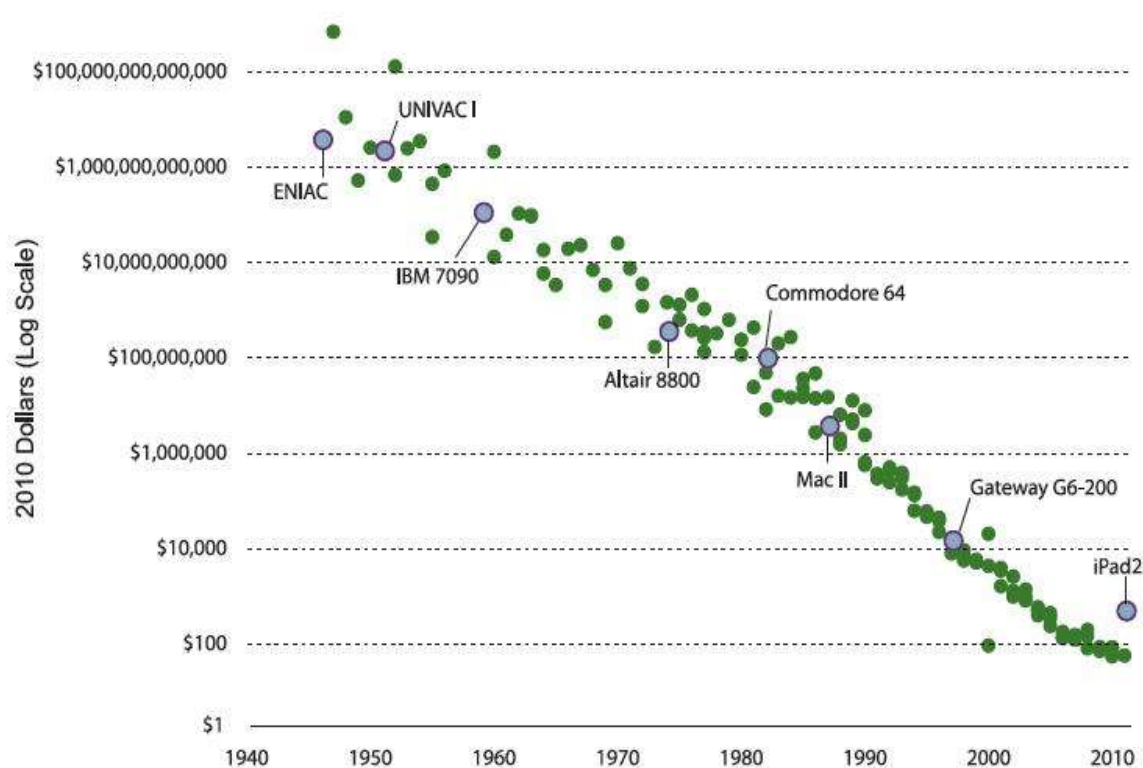
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Transformational Innovations

ICT sector – exponential change

FIGURE 3.

Cost of Computing Power Equal to an iPad 2



Note: The iPad2 has computing power equal to 1600 million instructions per second (MIPS). Each data point represents the cost of 1600 MIPS of computing power based on the power and price of a specific computing device released that year.

Source: Moravec n.d..



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New Energy

- **1970-ties:** first signs that oil dependence is not sustainable
- **Past 25 years:** emergence of climate change awareness and interest in other energy sources
- **Coming 25 years:** diversification of energy sources
- **2035-2050:** convergence to 1 or 2 main sources of renewable energy
- **New energy:** from biotechnology or existing natural source (sun, geothermal or other)?

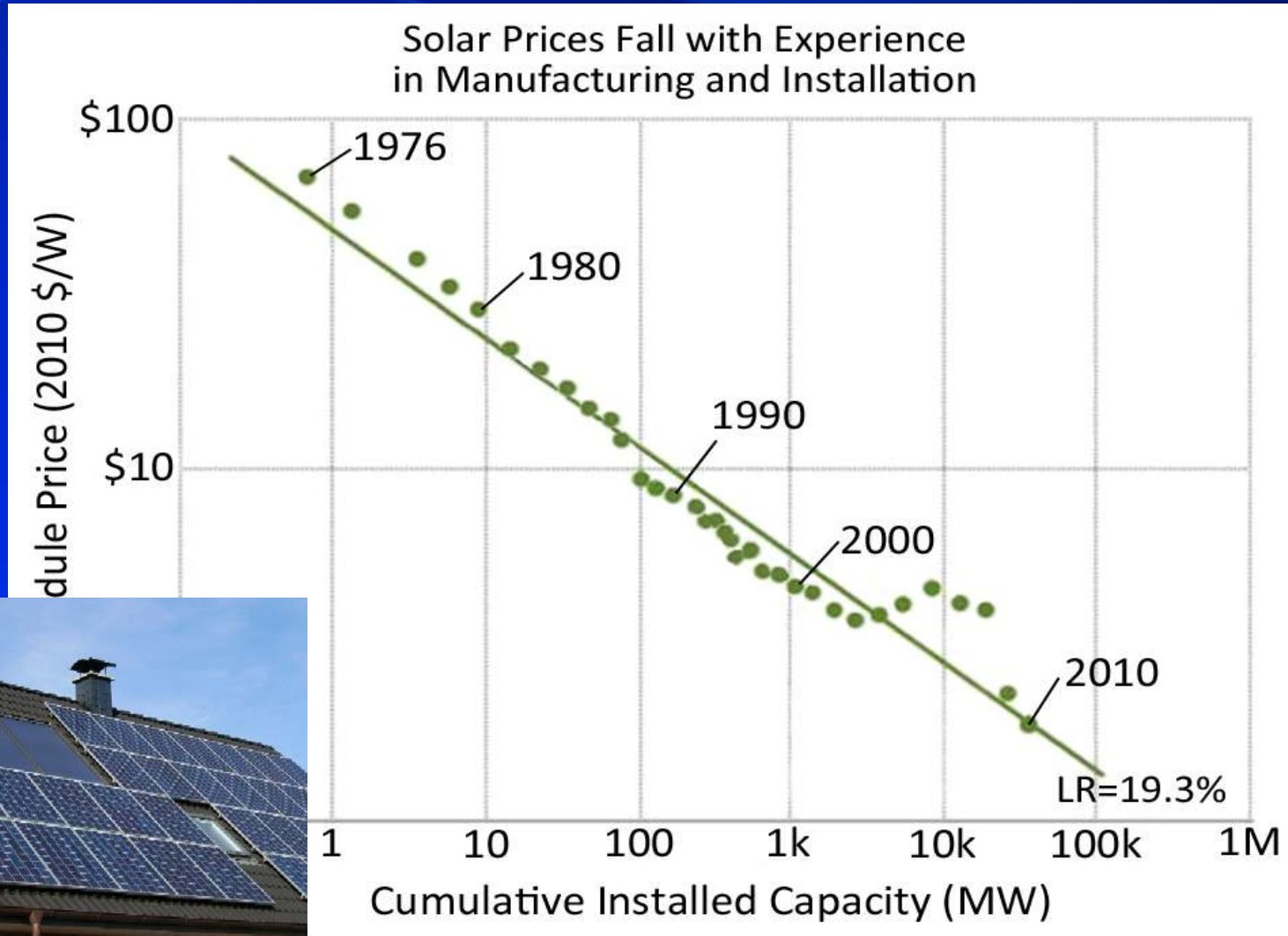




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Transformational Innovations

Solar Energy – exponential change





New Water Picture the City of the Future





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Water for Cities

**Sewer
Network**



Centralised WWTP

**Effluent
discharge**

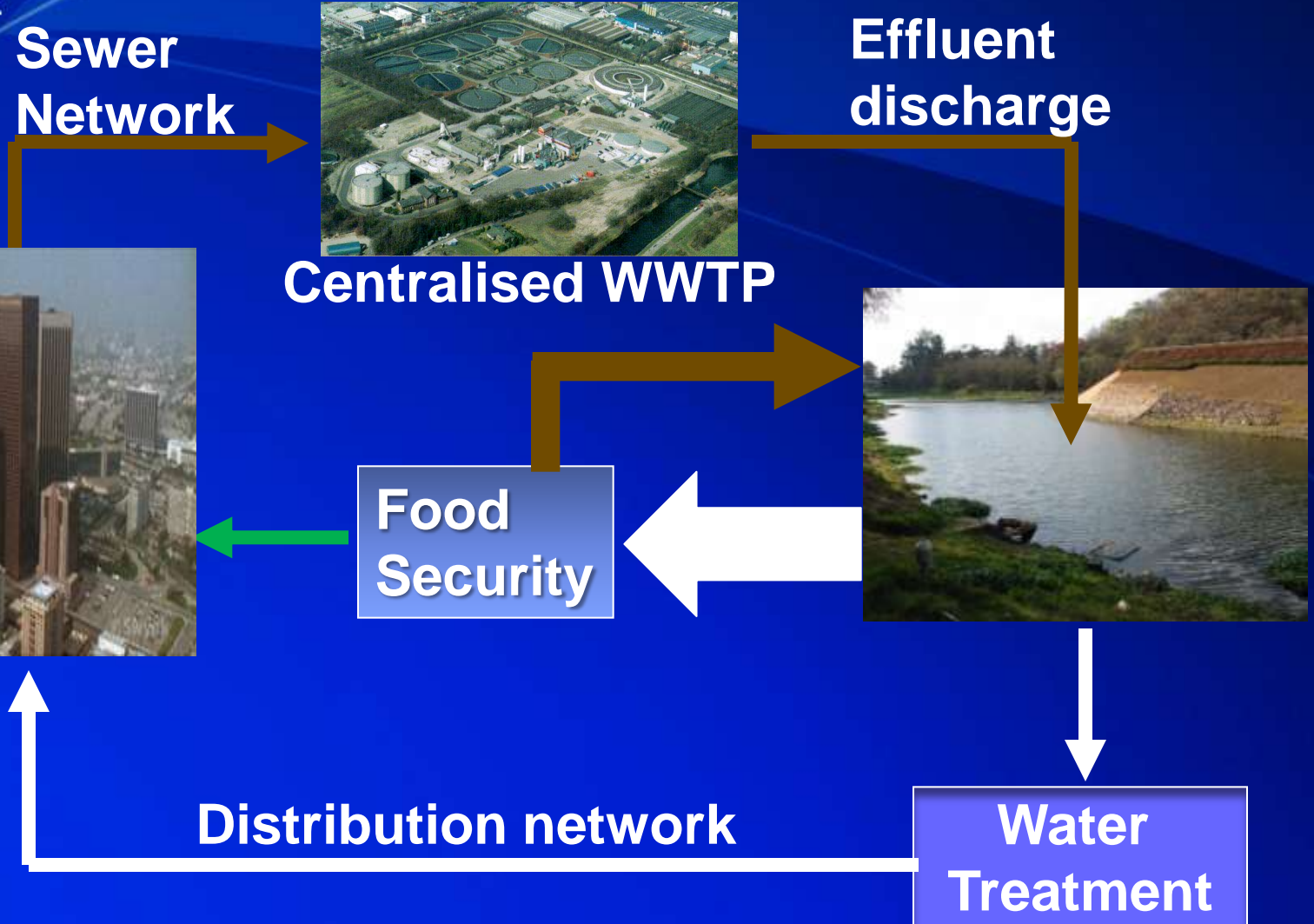


**Food
Security**



Distribution network

**Water
Treatment**





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Anything wrong with water in the city today?





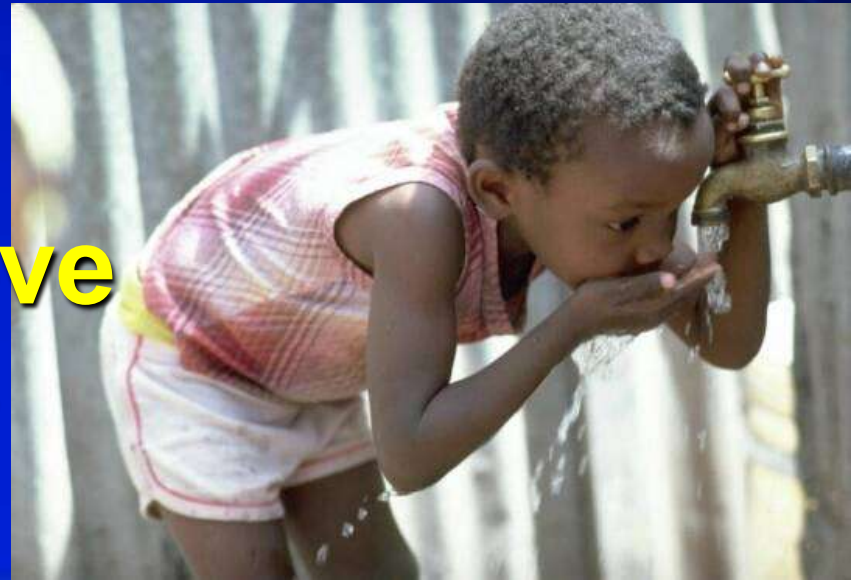
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Urban Water Management

3 Main Objectives:

- Provide a good service to people and industry
- Improve Public Health
- Environmental sustainable

**What did we achieve
in past 150 years?**





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1. Good Service to People?

Some facts and figures:

- **0.8 billion people have no access to safe drinking water**
- **2.5 billion people lack appropriate sanitation**
- **5 billion people live in conditions where wastewater is discharged untreated into local water bodies**

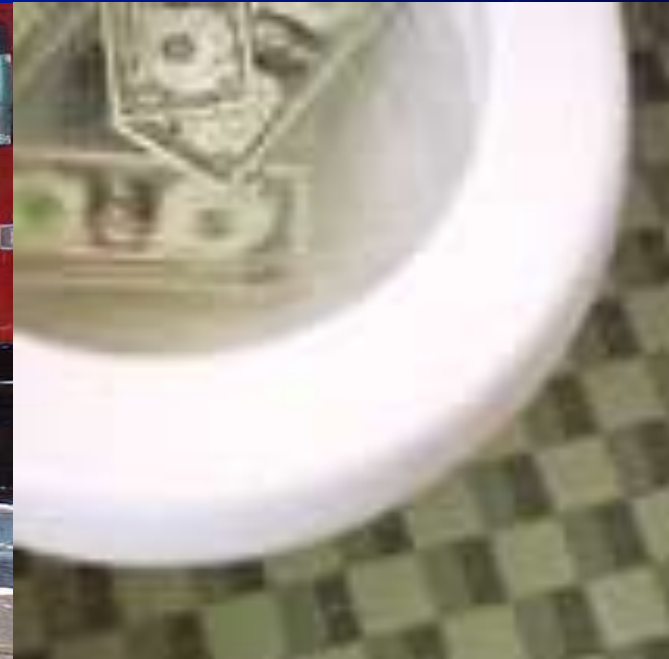




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Good service to People?

Water abuse: Too much and too high quality





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Good service to People?

Too little (drought) or too much (flooding)

Worsened by climate change and climate variability





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2. Improve Public Health

Water is Life!

.....indeed, but

Water is also a major Killer!





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Public Health

**Every year millions of people die from
water-borne disease, mostly children**



3. Environmental Sustainability



Wastewater Treatment: High tech 'end of pipe' solutions are expensive....

US: \$ 110 billion per year

EU: \$ 115 billion per year



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..and still do not produce safe effluents

Endocrine disruptors

Pathogens

Micro-contaminants



**While 80% of all wastewater is not treated!
....and the consequences are clear.....**

...a bridge over troubled water....



Contradiction Target 7c – MDG7

Vision21: Safe water for all by 2025

1 l sewage destroys 100 l of fresh water, so annually **58.000 km³** water resource will be affected!

Renewable water availability: **40.000 km³/y !!**

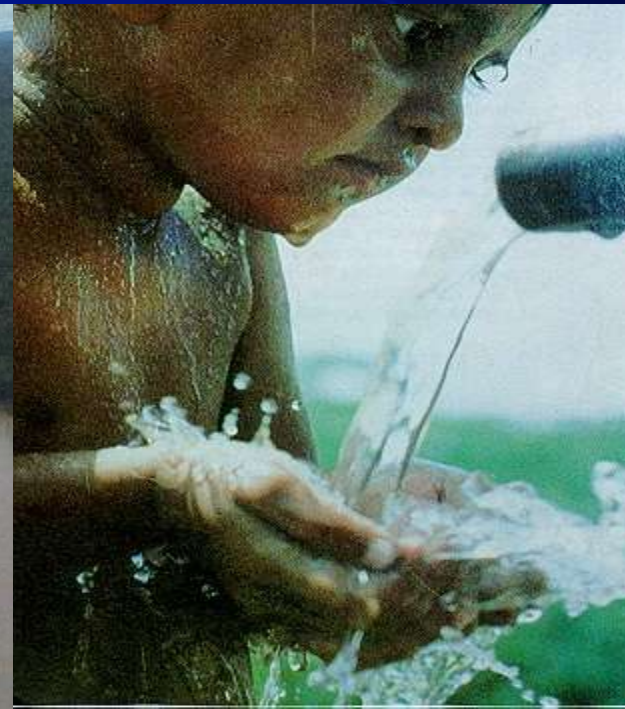




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Contradiction Target 7c – MDG7

Achieving Target 7c will also negatively impact on other MDGs (MDG 1, MDG 4, MDG 6)





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New Water

Development of sustainable and effective water management in **'The City of the future'**

Three Simple Steps:

- Reduce water use (all uses)
- Reuse water (water chain)
- Help water (eco-)systems cope





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Waterscapes

for drainage, retention, recharge, esthetics





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Floating buildings adjustable to any flow regimen





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Saving on relocation



A person wearing a red helmet and dark clothing is pushing a red vacuum machine across a green field. The machine has a white hopper on top. In the background, there are some buildings and a tall white pole under a clear sky.

**Vacuum to transport excreta
to underground composting for energy**





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Urine separation and resource recovery





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New Food

- The challenge is to produce sufficient protein/cal for 9 billion people in 2050
- Key limiting factors: water, land, energy, disease, disaster, pollution





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Limits to Growth

Global food production:

- Occupies 25% of all habitable land
- Is responsible for 70% of fresh water consumption,
- for 80% of deforestation, and
- for 30% of greenhouse gas emissions.
- It is the largest single driver of biodiversity loss, and
- It is the largest non-point source pollution globally





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Food Security for the 21st Century

- Increasing crop yield
- Reduce crop vulnerability to environmental stress
- Reduce dependence on fertiliser, pesticides
- Reduce water dependence
- Increase nutritional status
- **New Food**





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New Farming

- **Carousel system in Singapore with full recycle of water and nutrients**

The future





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New Food

Science or Science Fiction?



The idea of food produced in factories is not so far from reality as we might think



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Steak of the Art

A 330,000\$ Hamburger





Imagine
Water in the city of the future



A sustainable future is within reach





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Partner in Building
the future we want for all



Thank You!