

Making Cities Livable and Sustainable – for People, not just Economics

***Indo-UK Round Table
New Delhi, 7 December 2013***

Ashok Khosla
Development Alternatives

**Political
Will**

Finance

Water

Environment

Governance

Electricity

Management

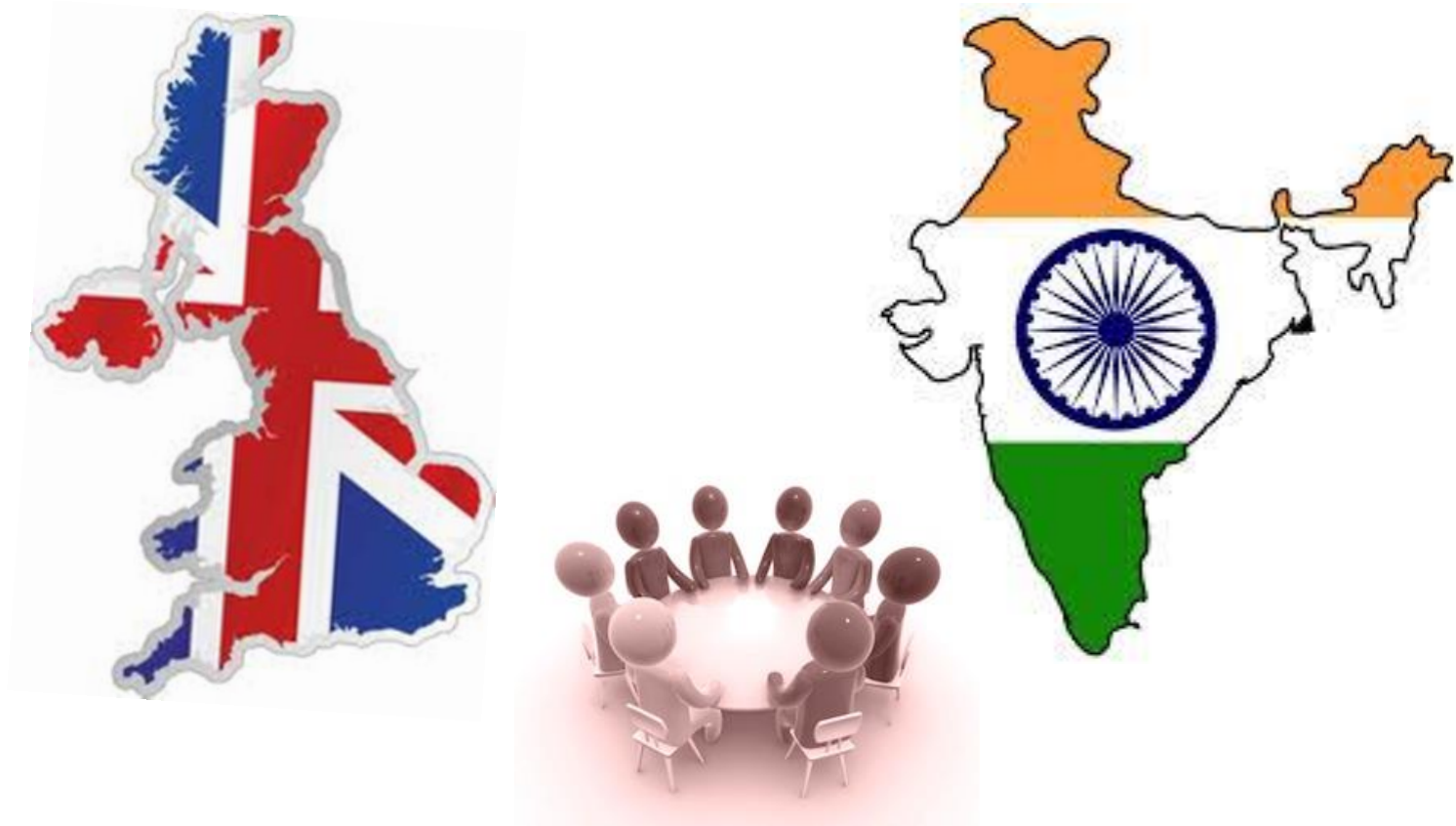
Urban Planning

Waste

?



Indo-UK Round Table



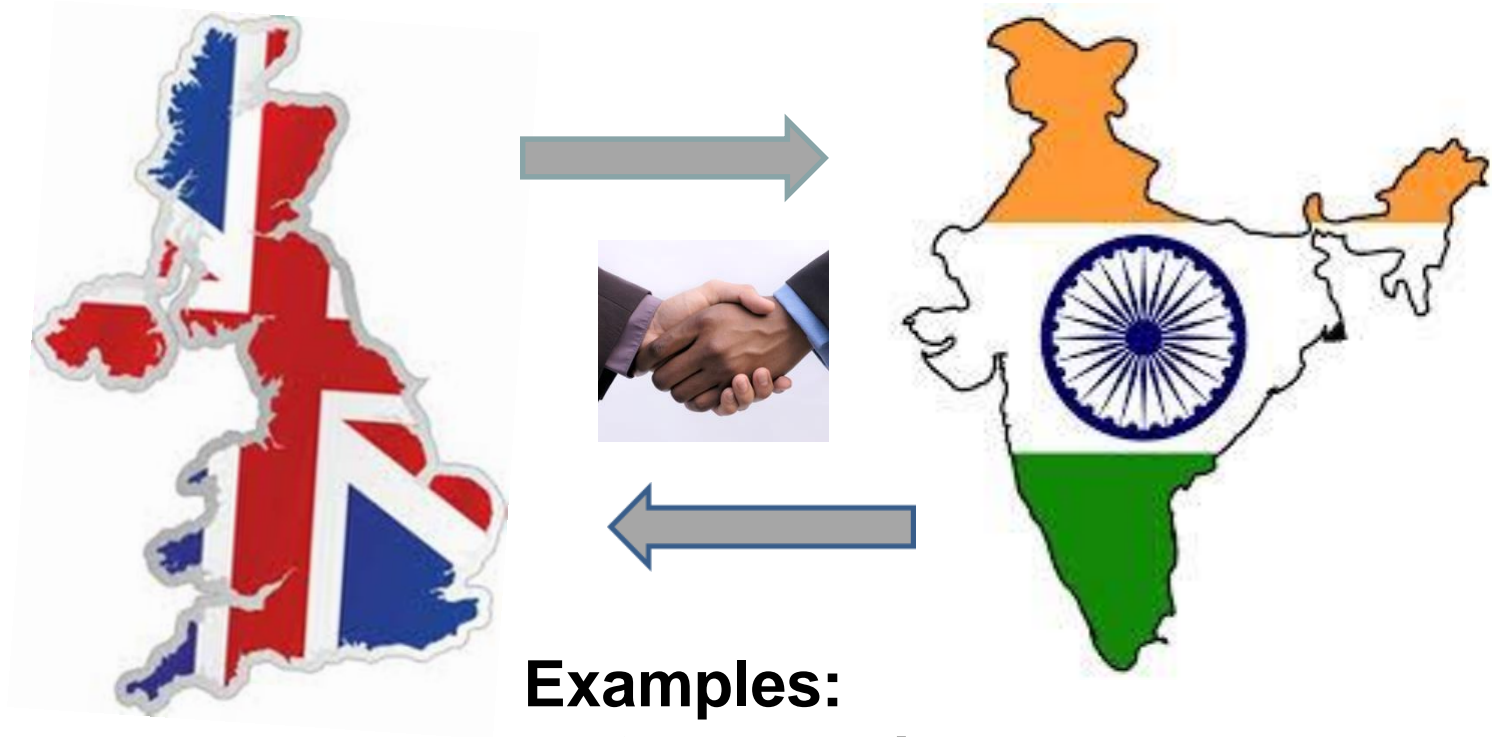
(Not to Scale)



Development Alternatives

Indo-UK Round Table

Ongoing Relationships - Issues of Mutual Interest



Examples:

- Education
- Health Care
- Visas
- Etc



Indo-UK Round Table

Strategic Relationships - Partnership Opportunities



Examples:

- Climate
- Biodiversity
- Natural Resources
- Global Trade
- Etc



Indo-UK Round Table

Strategic Relationships - Partnership Opportunities



Today:

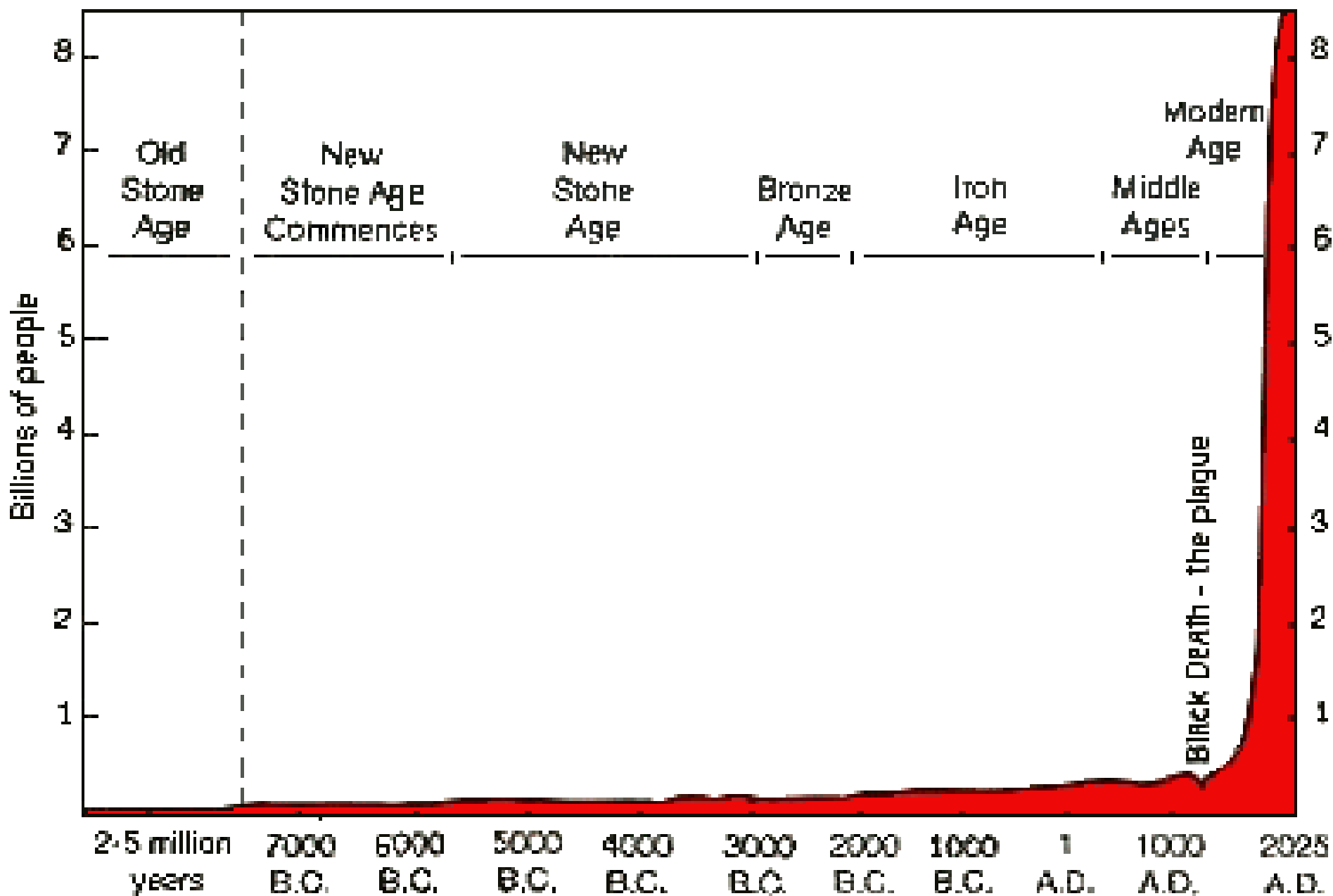
Cities

- Natural Resources
- Global Impacts



Development Alternatives

World Population Growth Through History



Global GDP 1820 to 2020



Global GDP 1970-2030



FROM EMPTY TO FULL WORLD



HOLOCENE



ANTHROPOCENE

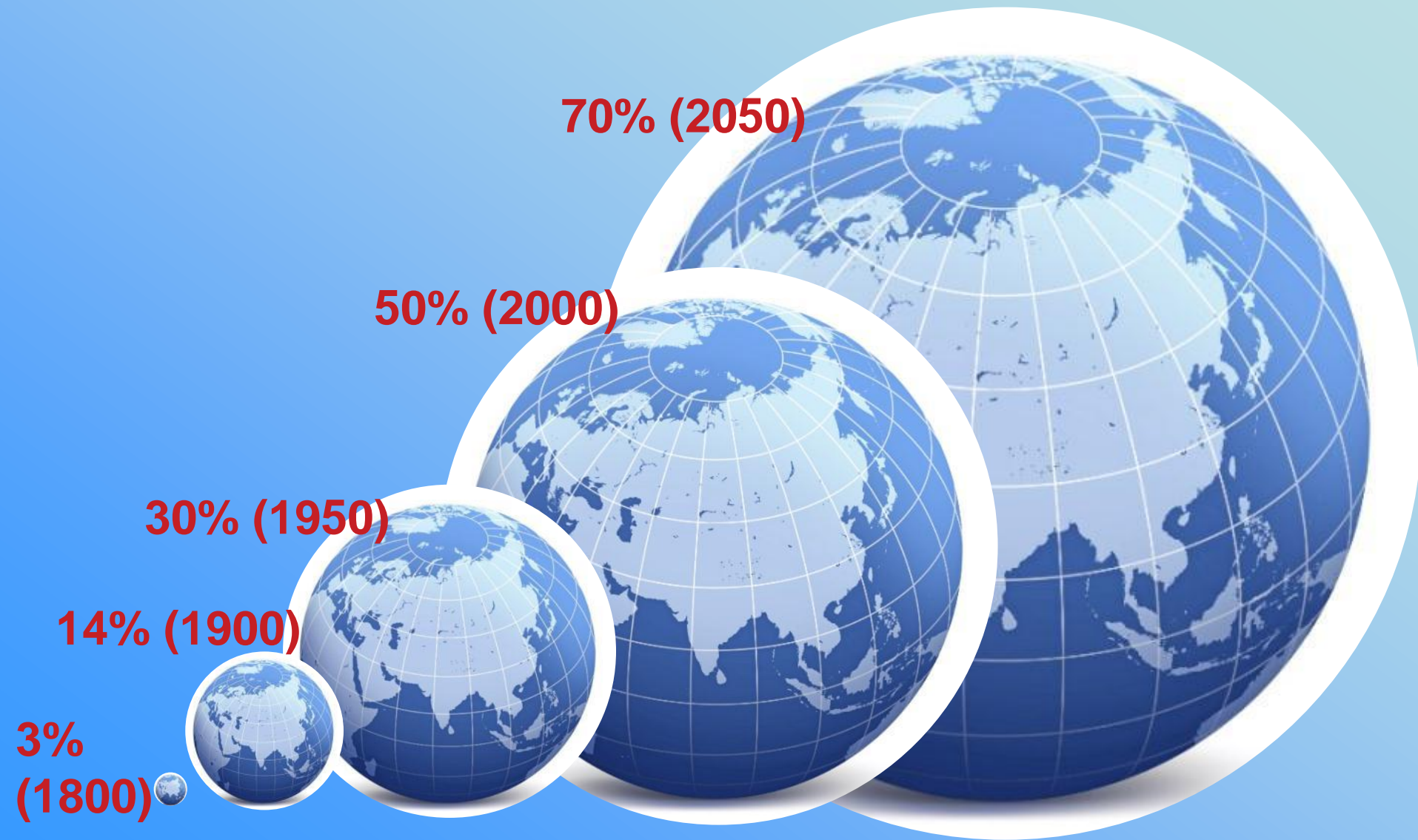
Upto 1800

Since 1800



Development Alternatives

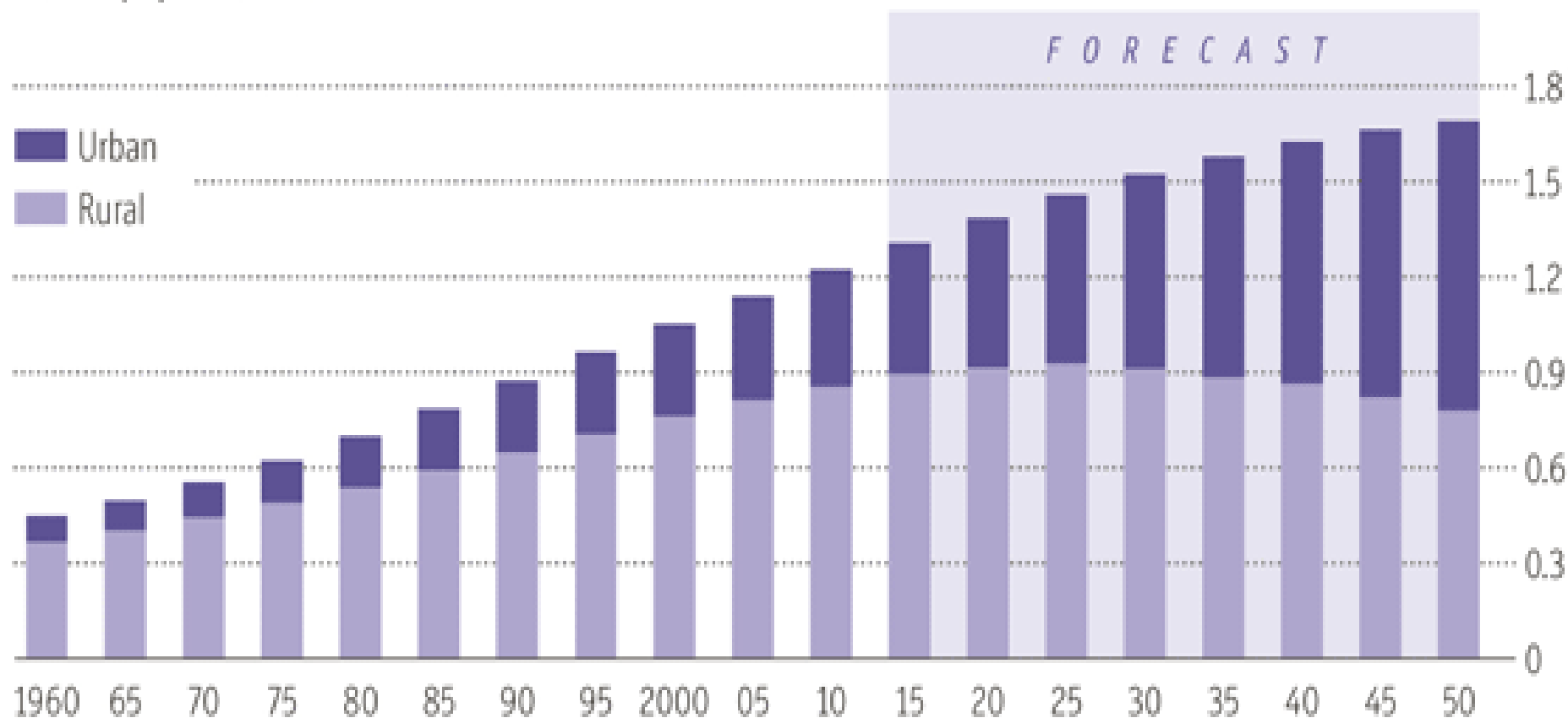
SHIFT TO AN URBANIZED WORLD



Urbanization in India

The slow road to the city

India's population, bn



Sources: World Bank; UN Population Division

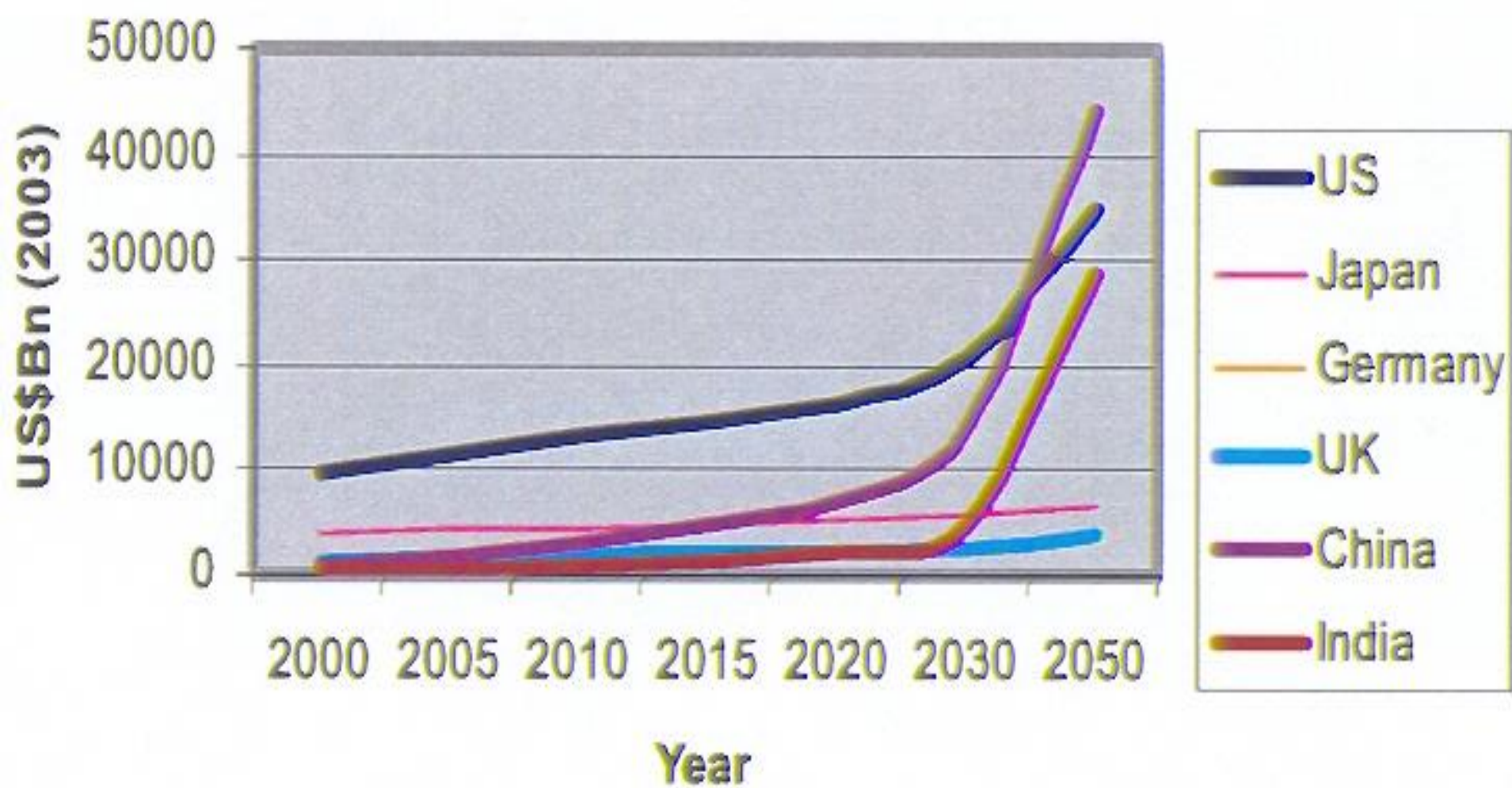
THE RISE OF CITIES

Number of Indian cities with a population over 1 million

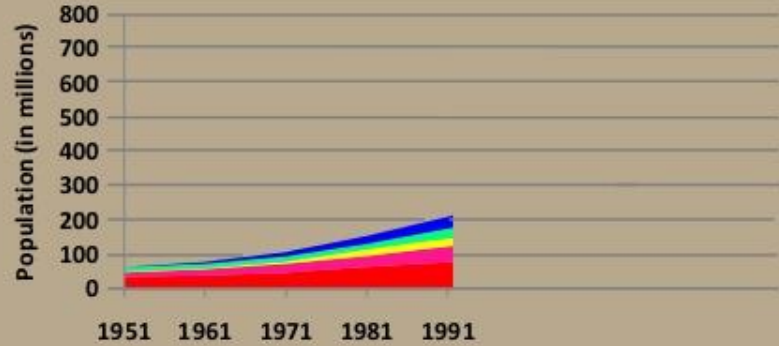


Goldman Sachs GDP Forecast

- Dreaming with Brics: The Path to 2050



1991



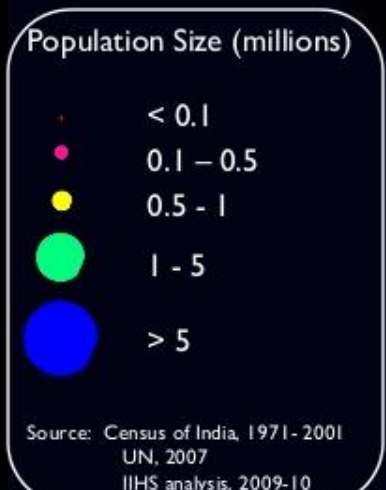
Delhi
(8.2)

Urban Population Growth

Kolkata
(10.9)

Mumbai
(12.3)

Chennai
(5.3)



2011

3 cities with a
population > 10 m
and 53 with > 1m

833 m live in 0.64 m
villages
377 m live in ~ 8,000
urban centres

Delhi
(16.9)

Ahmedabad
(5.7)

Mumbai
(20)

Pune
(5.0)

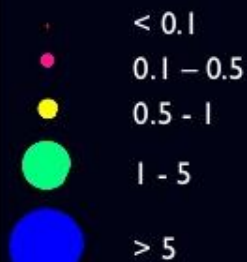
Bangalore
(7.2)

Hyderabad
(6.7)

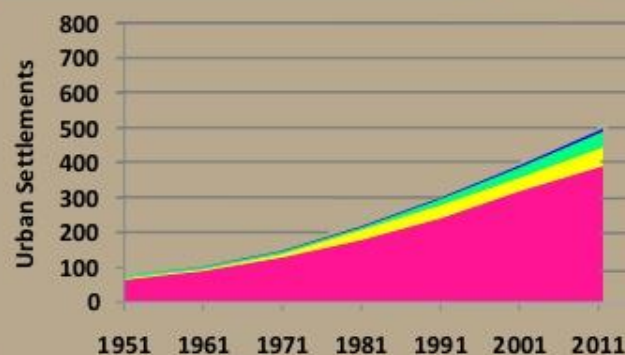
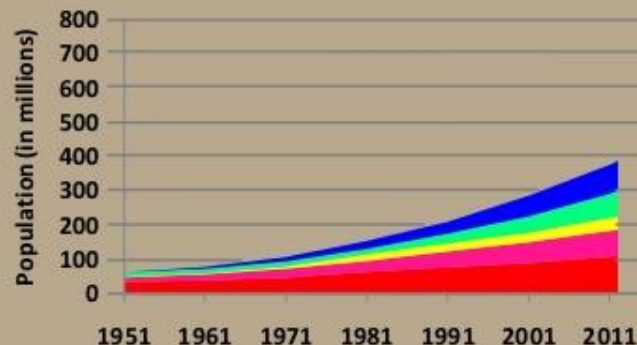
Kolkata
(15.5)

Chennai
(7.5)

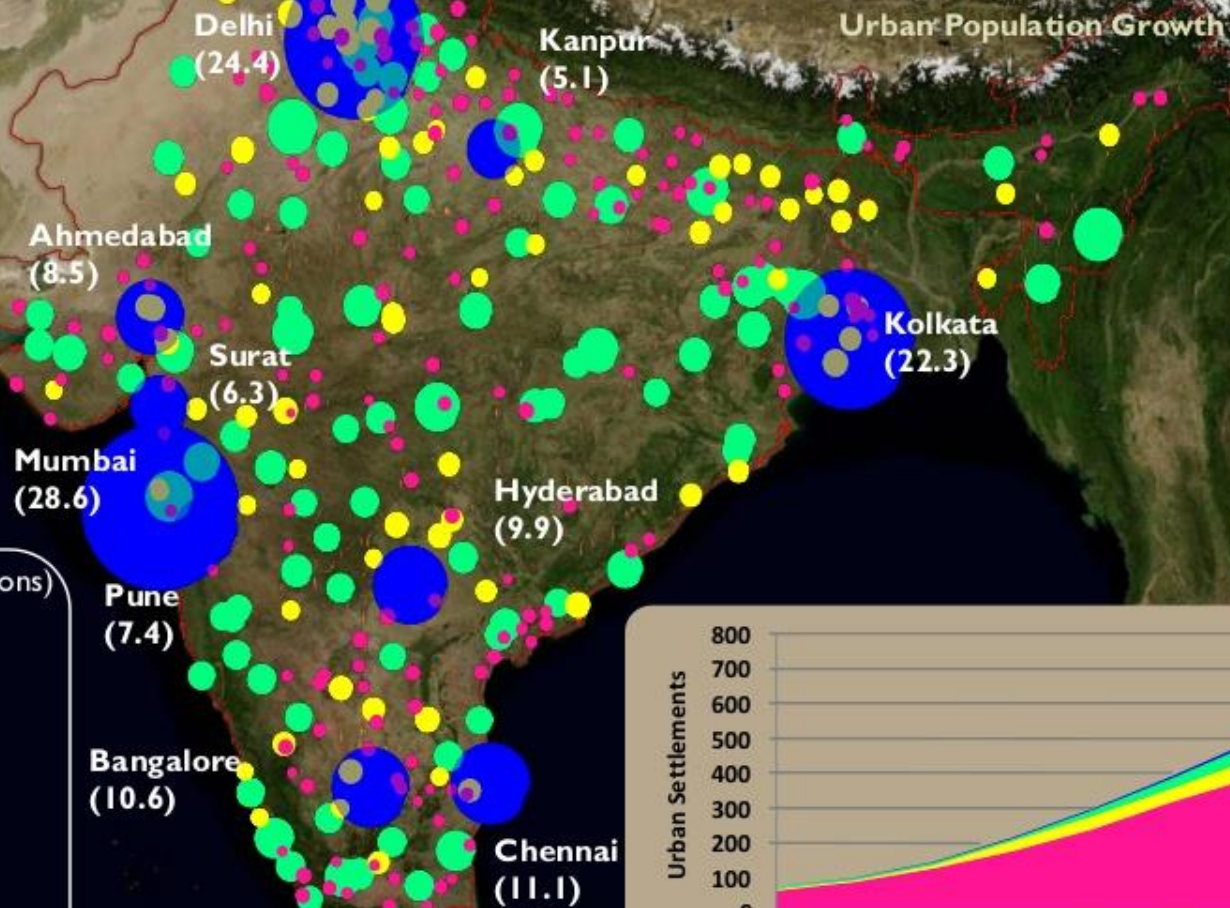
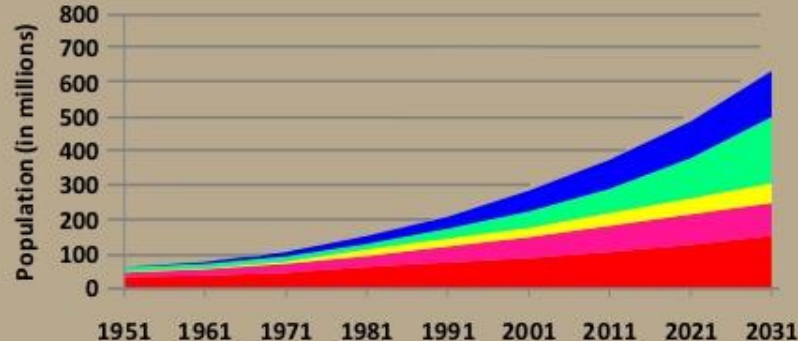
Population Size (millions)



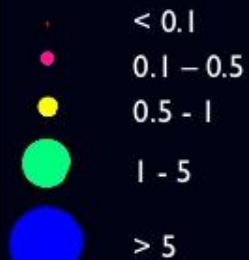
Source: Census of India, 1971-2001
UN, 2007
IIHS analysis, 2009-10



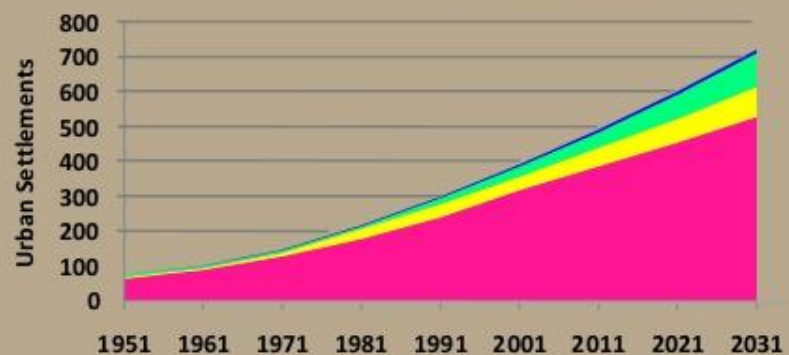
2031



Population Size (millions)



Source: Census of India, 1971-2001
UN, 2007
IIHS analysis, 2009-10



Large Urban Settlement Growth

EXPLOSION OF THE GLOBAL MIDDLE CLASS

- 1 billion in 1990
- 2 billion in 2010
- 5 billion by 2030

EXPLOSION OF THE MIDDLE CLASS

- 3 billion added by 2030
- 90% of growth in Asia – mostly India and China





Consumption Patterns



Production Systems



Development Alternatives

VEHICLE INCREASE



250 million

1970

1 billion

2010

3 billion?

2050

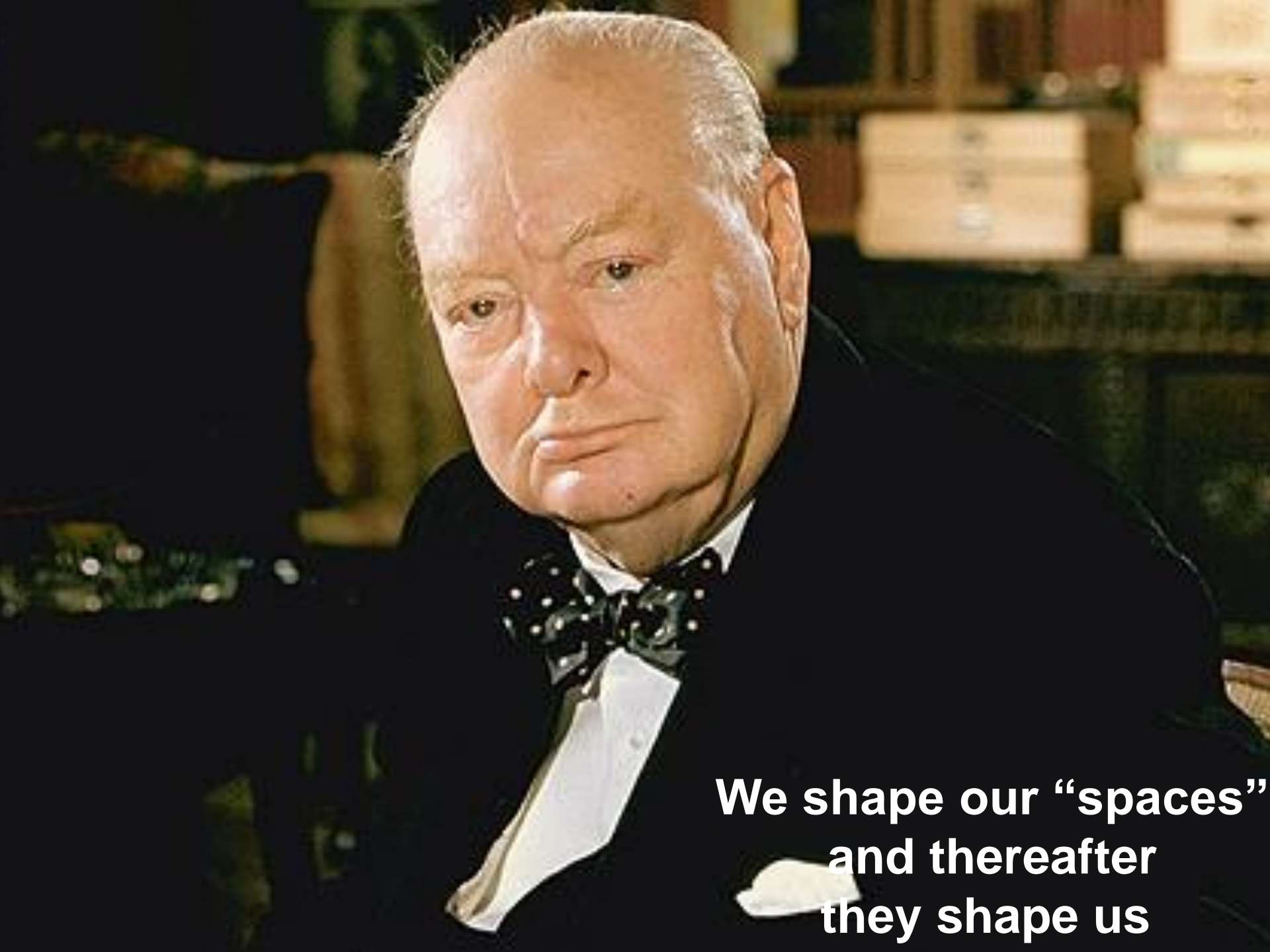
Energy and Materials





Lock-in for Decades
-- even Centuries





**We shape our “spaces”
and thereafter
they shape us**

Materials



Logging and Deforestation





Development Alternatives

Waste



TIME LOST

4 hours each day
10% of GDP



Development Alternatives



WORLD RESOURCES INSTITUTE



6.5 Billion Dollars

+ 300 Million Every Year



Development Alternatives

Impacts:

- **Global**
- **Local**



Climate Change





Development Alternatives

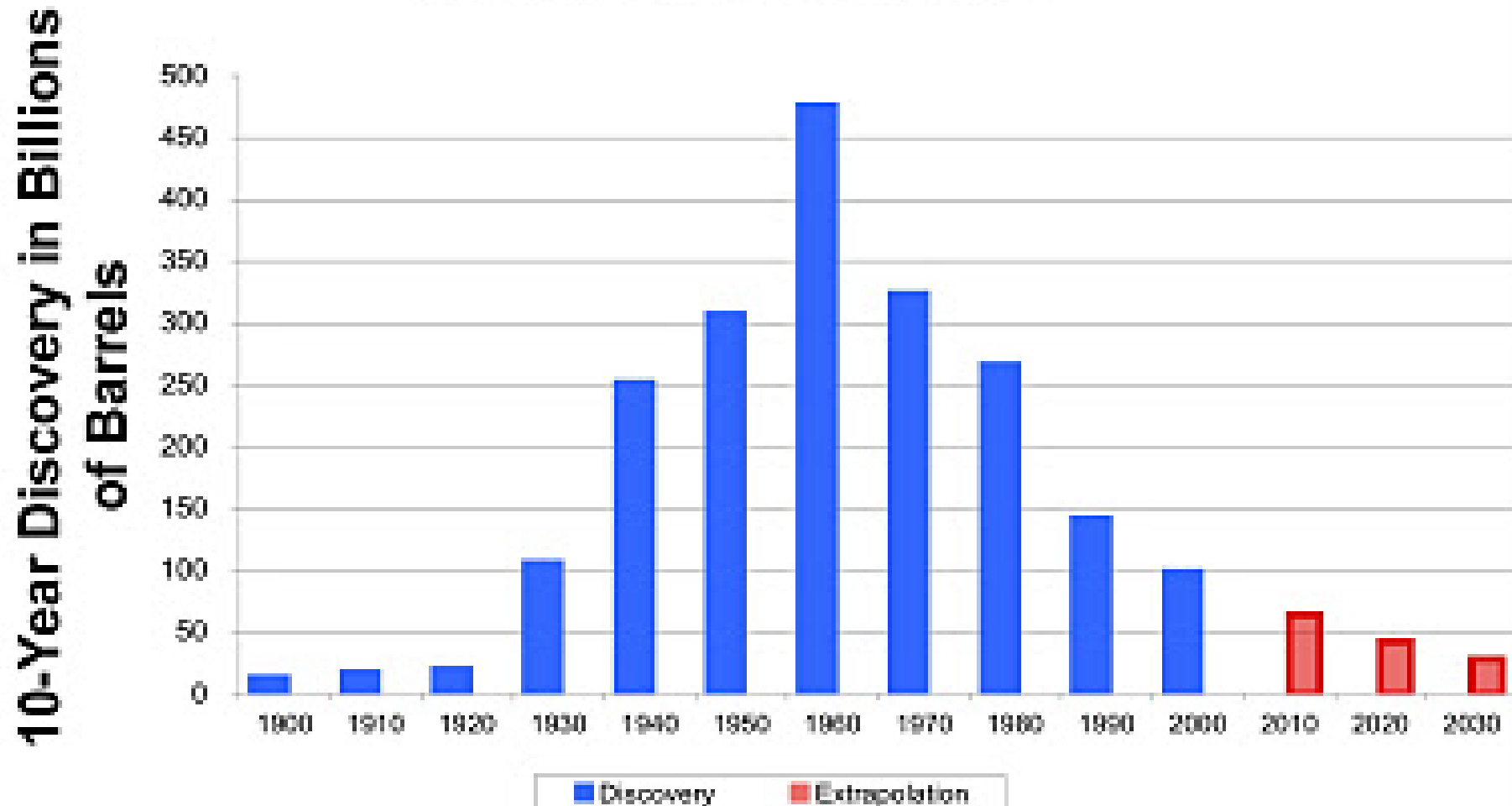
Endangered Species

Sushi Chain Pays \$1,760,000 for one of the Last Wild Bluefin Tuna



PEAK OIL

New Oil discoveries have been declining since 1964



Note: World oil discovery over 10-year periods, by Association for the Study of Peak Oil and Gas.

Not Just Peak Oil... “Peak Many Things” In The Next 20 Years

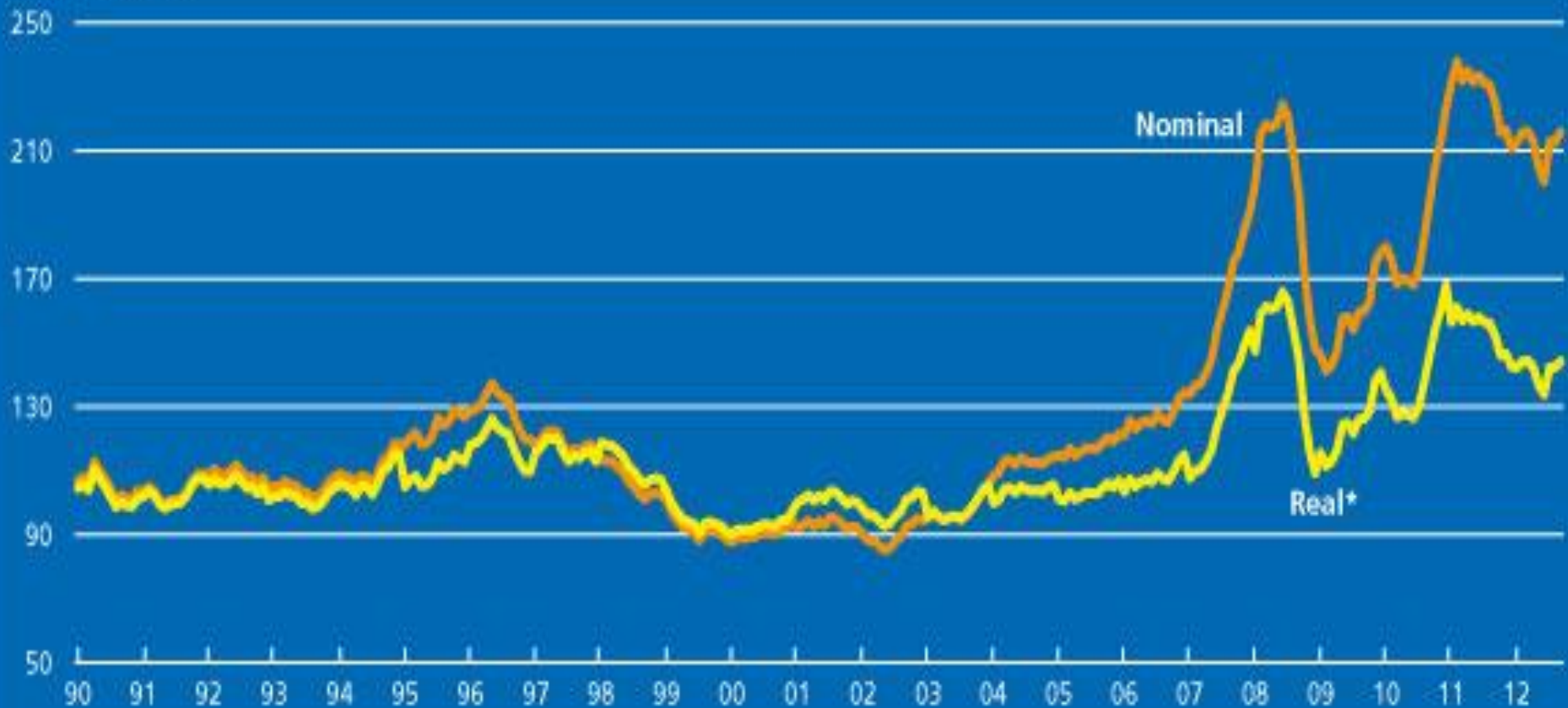
- Food production
- Topsoil
- Phosphorous
- Fish
- Water supplies
- Uranium
- Some minerals –
 - Tungsten
 - Tantalum
 - Rare Earths



World Food Prices - FAO

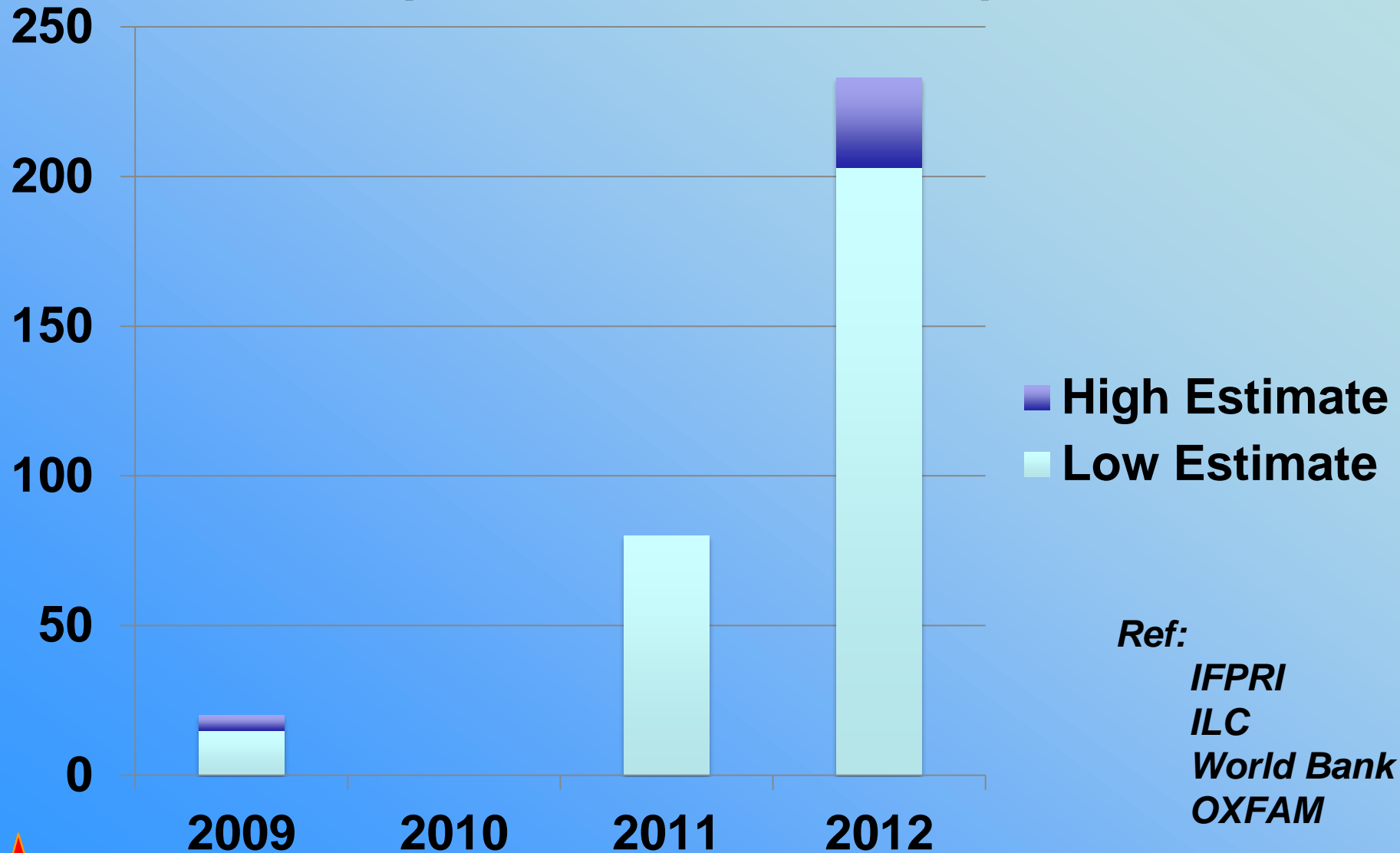
FAO Food Price Index

2002-2004=100



* The real price index is the nominal price index deflated by the World Bank Manufactures Unit Value Index (MUUV)

Land Acquired Overseas Since 2001 (Million Hectares)



Symptoms: Overseas Land Grabs

Land Grabs (2000-2011):
~ 100 Million Ha of Land
i.e., 1.5 Frances, 4 UKs
Land Matrix, IFPRI, Oxfam, W.B.

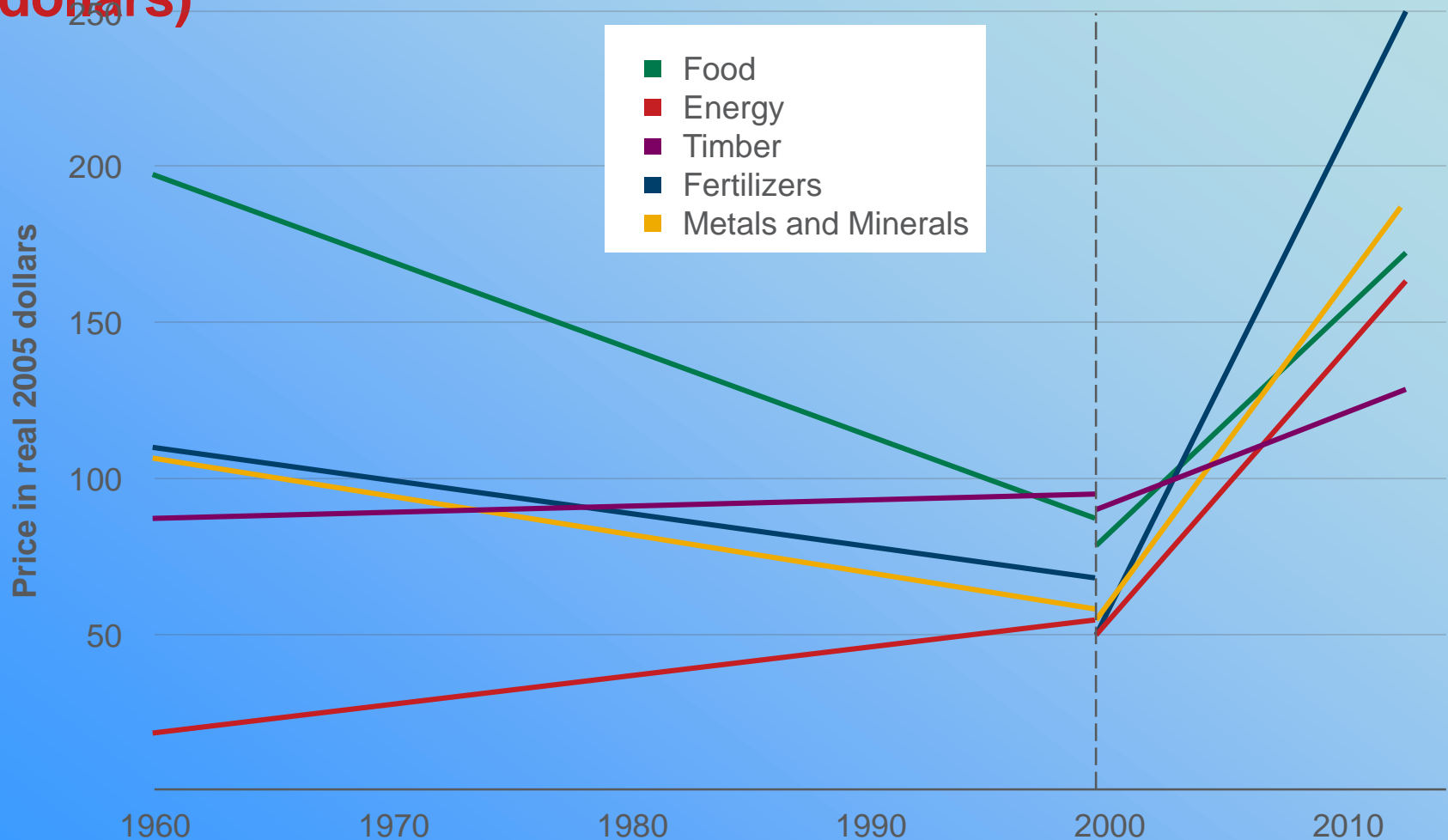


Water Grabs per year (2005-2009):
~ 500 Billion Cu M of Water
i.e., ~ 5% of World Water Use
Sci Am 12 Feb 2013 and PNAS Nov 2012



ARE WE RUNNING OUT?

Price trends of major commodity bundles (real 2005 dollars)

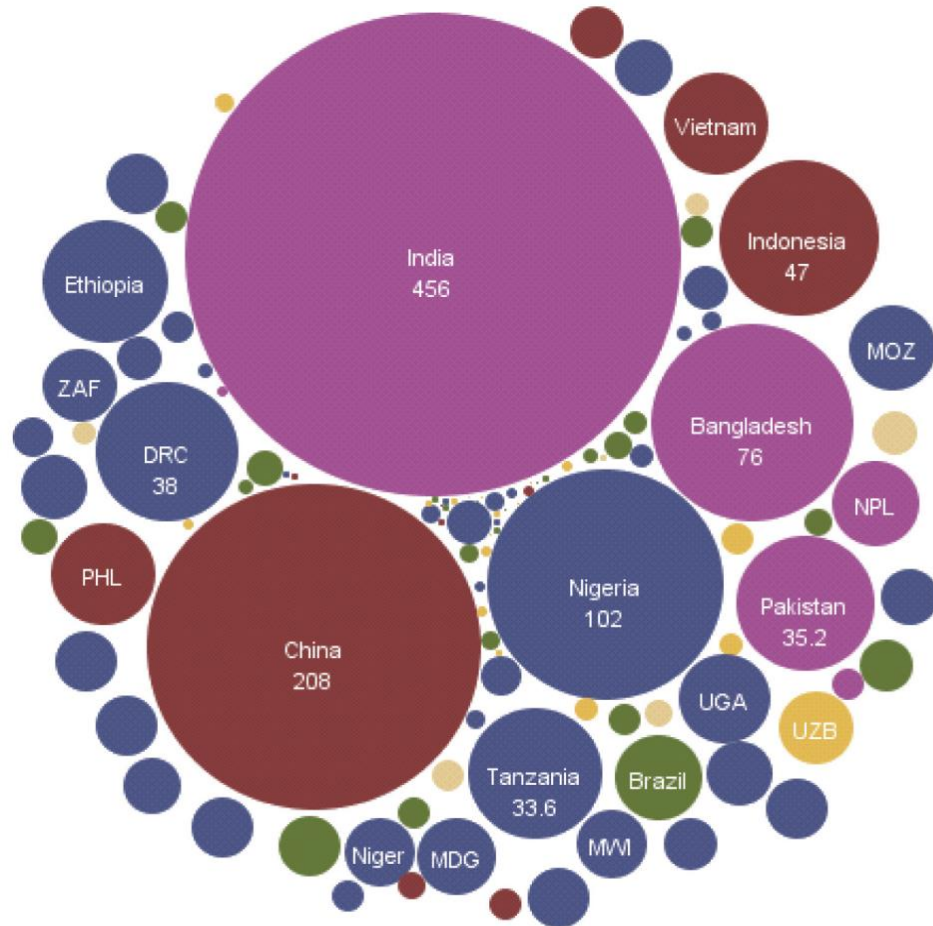


Chaotic, Lopsided “Development”

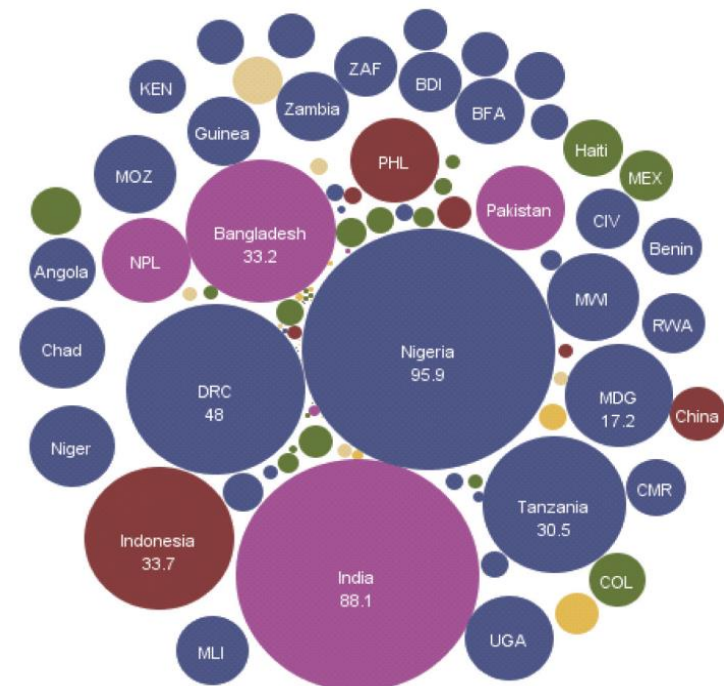


The location of poverty is shifting

2005



2015



- Sub-Saharan Africa
- Latin America and Caribbean
- Middle East and North Africa

- Europe and Central Asia
- East Asia and Pacific
- South Asia





Poverty *and* Environment: Eco-Refugees

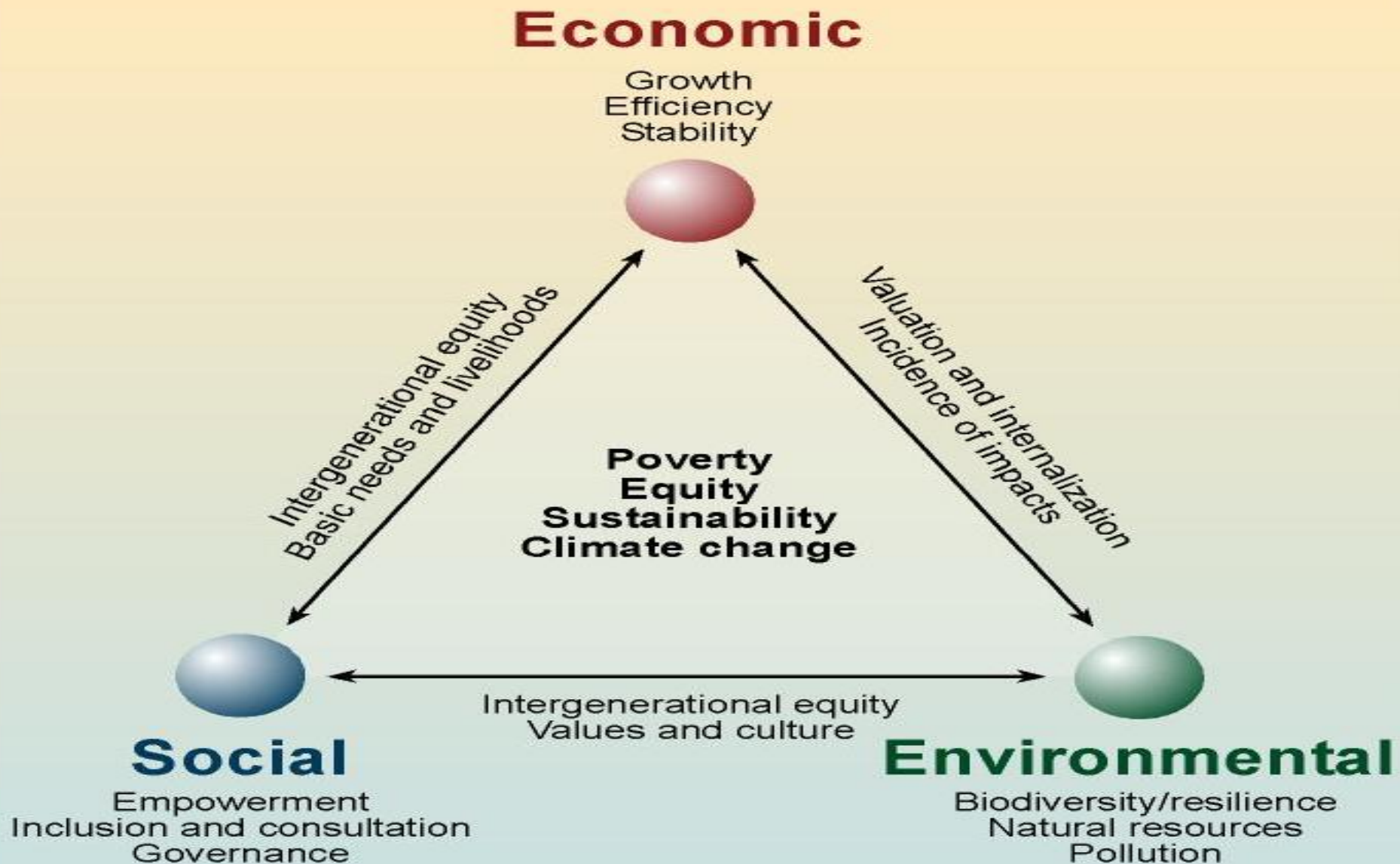


10/01/2006 8:08 am

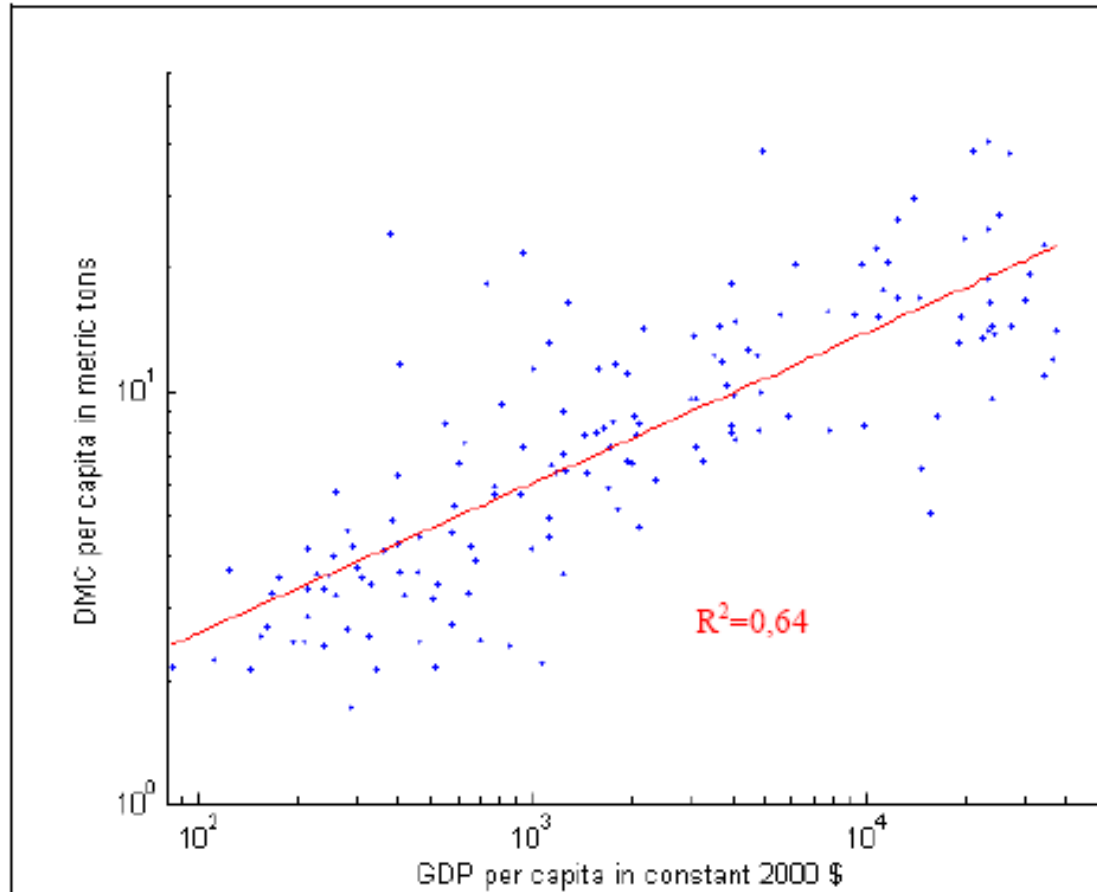


***Urban Development . . .
For whom? And how?***

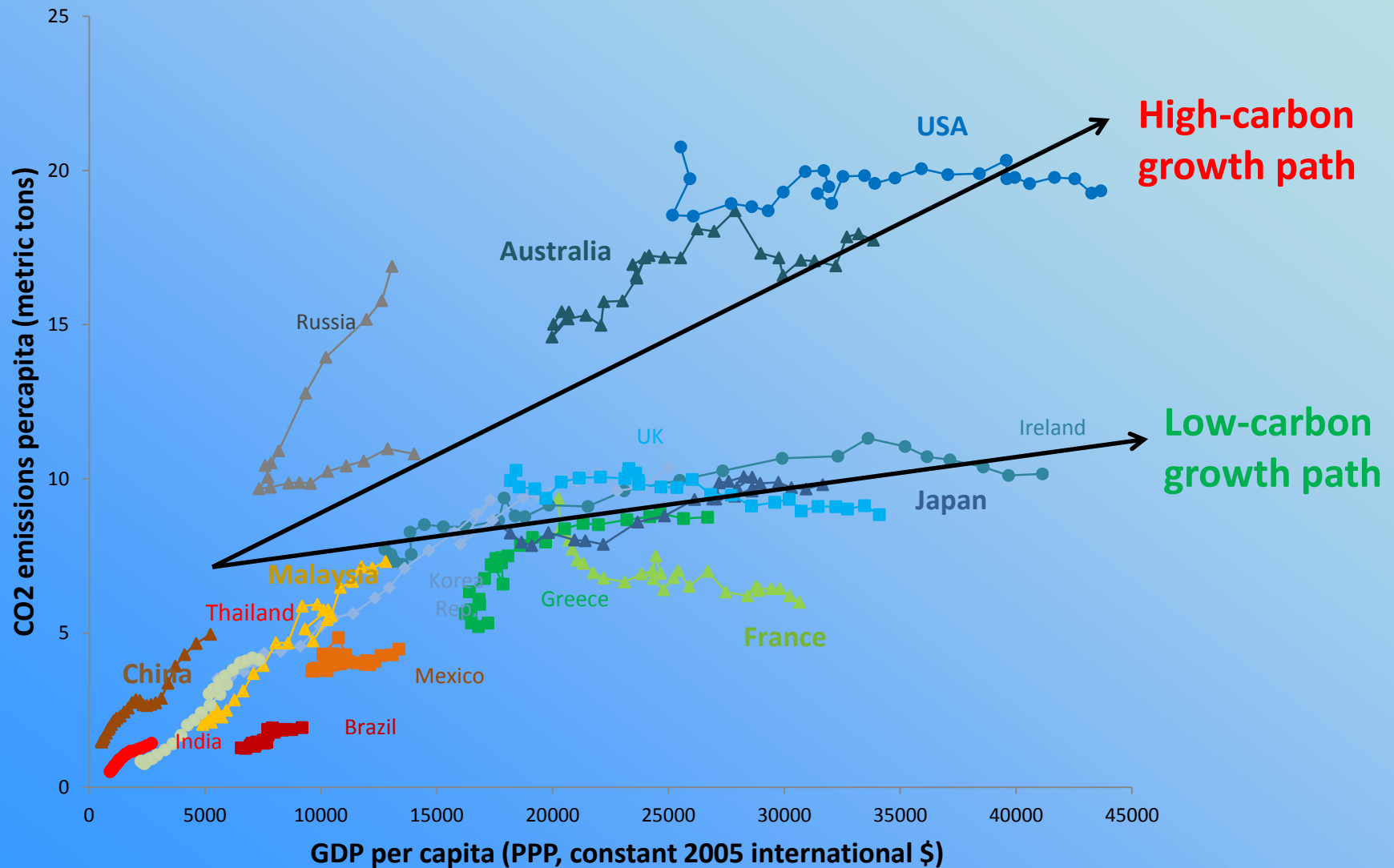
Key elements of sustainable development and interconnections



GDP goes with Domestic Material Consumption (DMC)



GREENING GROWTH THROUGH LOW-CARBON CITIES





CITY-LEVEL DECOUPLING

Urban resource flows and the governance of infrastructure transitions

Building upon previous work of the International Resource Panel on Decoupling Natural Resource Use and Environmental Impacts from Economic Growth, this report examines the potential for decoupling at the city level. While the majority of the world's population now live in cities and cities are where most resource consumption takes place, both the pressures and potentials to find ways to reconcile economic growth, wellbeing and the sustainable use of natural resources will therefore be greatest in cities.

Analysing the role of cities as spatial nodes where the major resource flows connect as goods, services and wastes, the report's focus is how infrastructure directs material flows and therefore resource use, productivity and efficiency in an urban context. It makes the case for examining cities from a material flow perspective, while also placing the city within the broader system of flows that make it possible for it to function.

The report also highlights the way that the design, construction and operation of energy, waste, water, sanitation and transport infrastructures create a socio-technical environment that shapes the "way of life" of citizens and how they procure, use and dispose of the resources they require. Its approach is innovative in that it frames infrastructure networks as socio-technical systems, examining pressures for change within cities that go beyond technical considerations. The importance of intermediaries as the dominant agents for change is emphasized, as well as the fact that social processes and dynamics need to be understood and integrated into any assessment of urban infrastructure interventions and the reconfiguration of resource flows.

A set of 30 case studies provide examples of innovative approaches to sustainable infrastructure change across a broad range of urban contexts that could inspire leaders of other cities to embrace similar creative solutions. Of course, innovations in and of themselves do not suffice if they are not integrated into larger strategic visions for the city, and as each city is unique, interventions need to be tailored to the set of challenges and opportunities present in each case.

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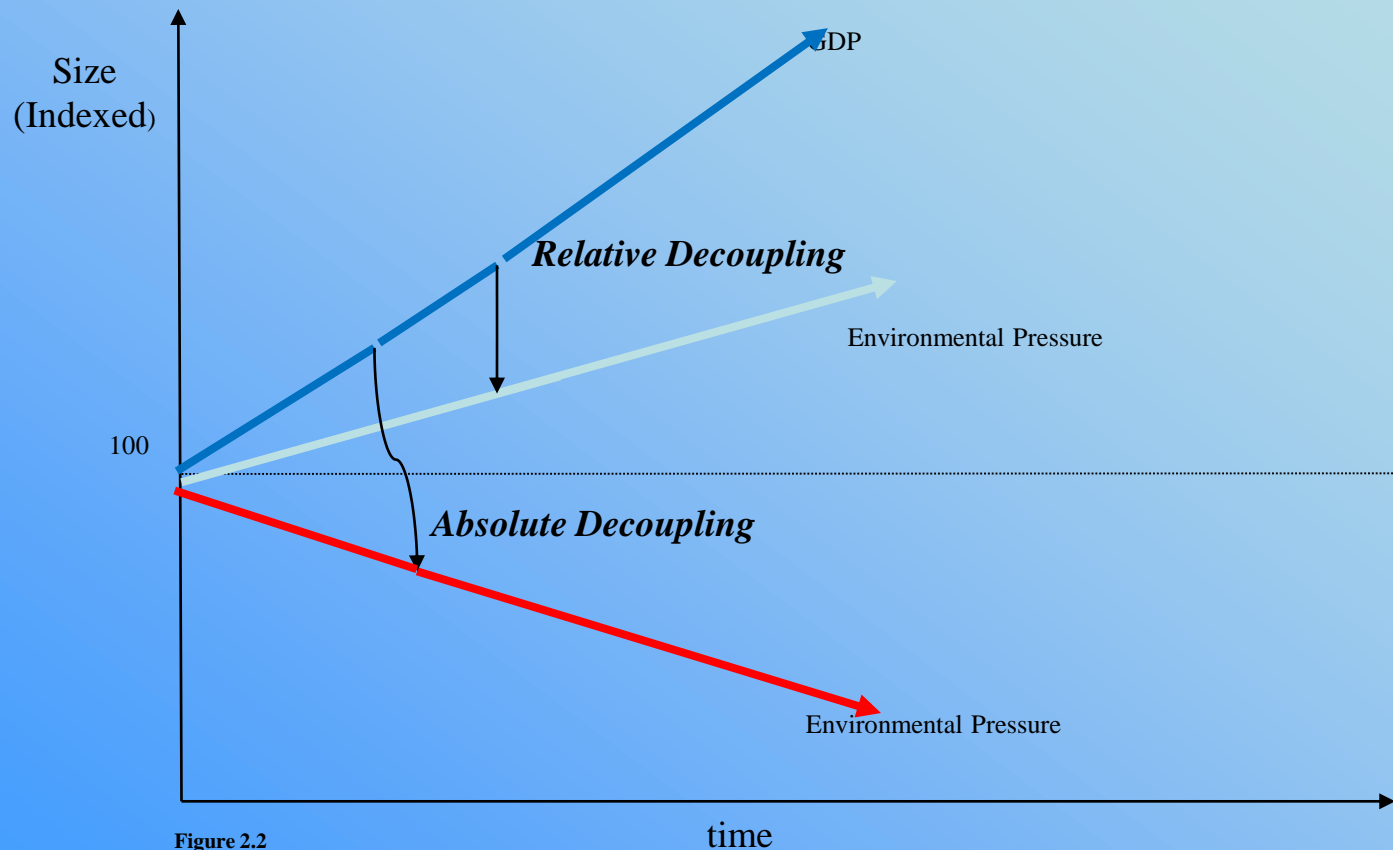


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E-mail: unep.tie@unep.org
www.unep.fr/scp

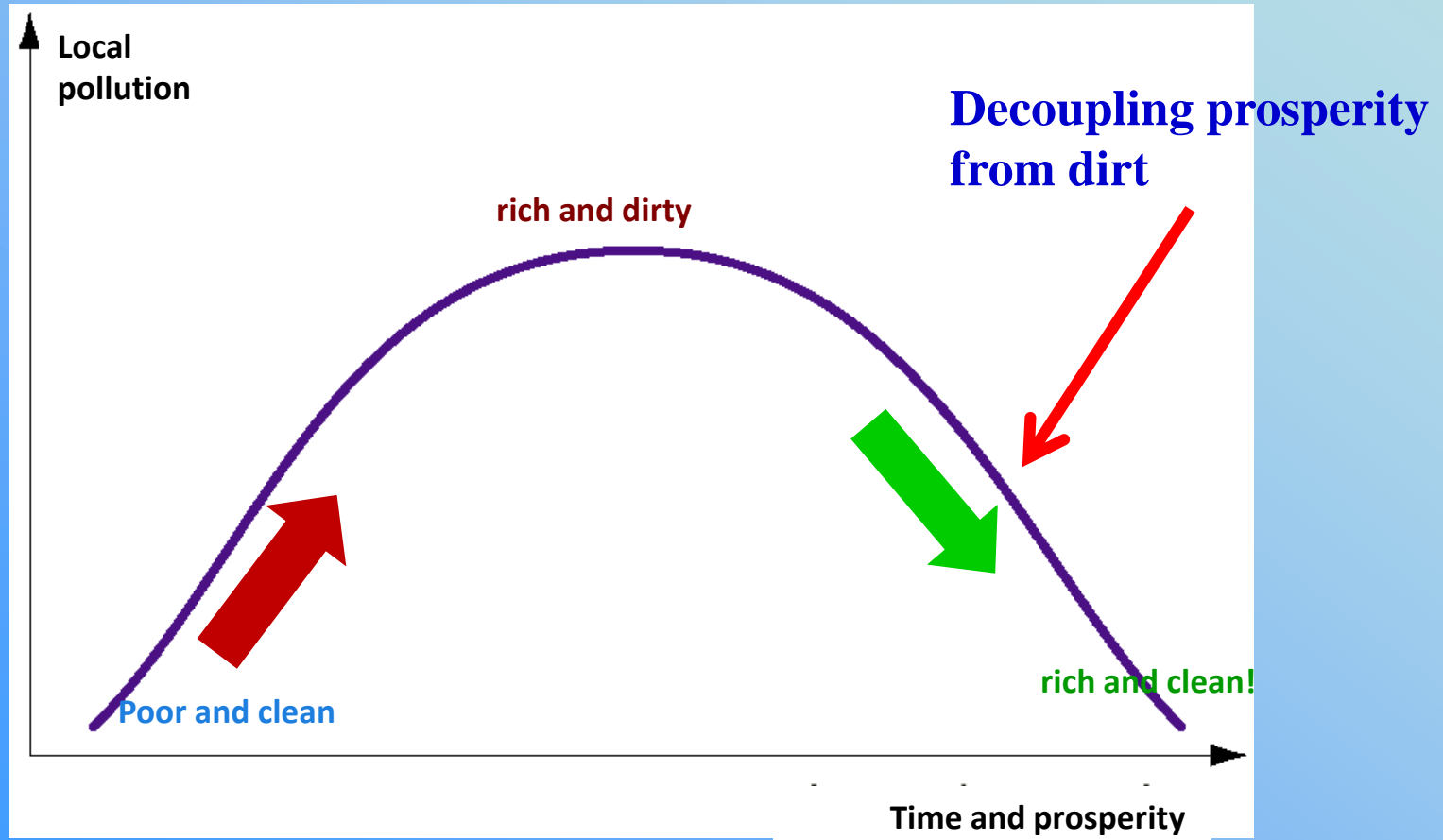


ISBN: 978-92-807-3298-8
Job Number: DTI/1587/PA

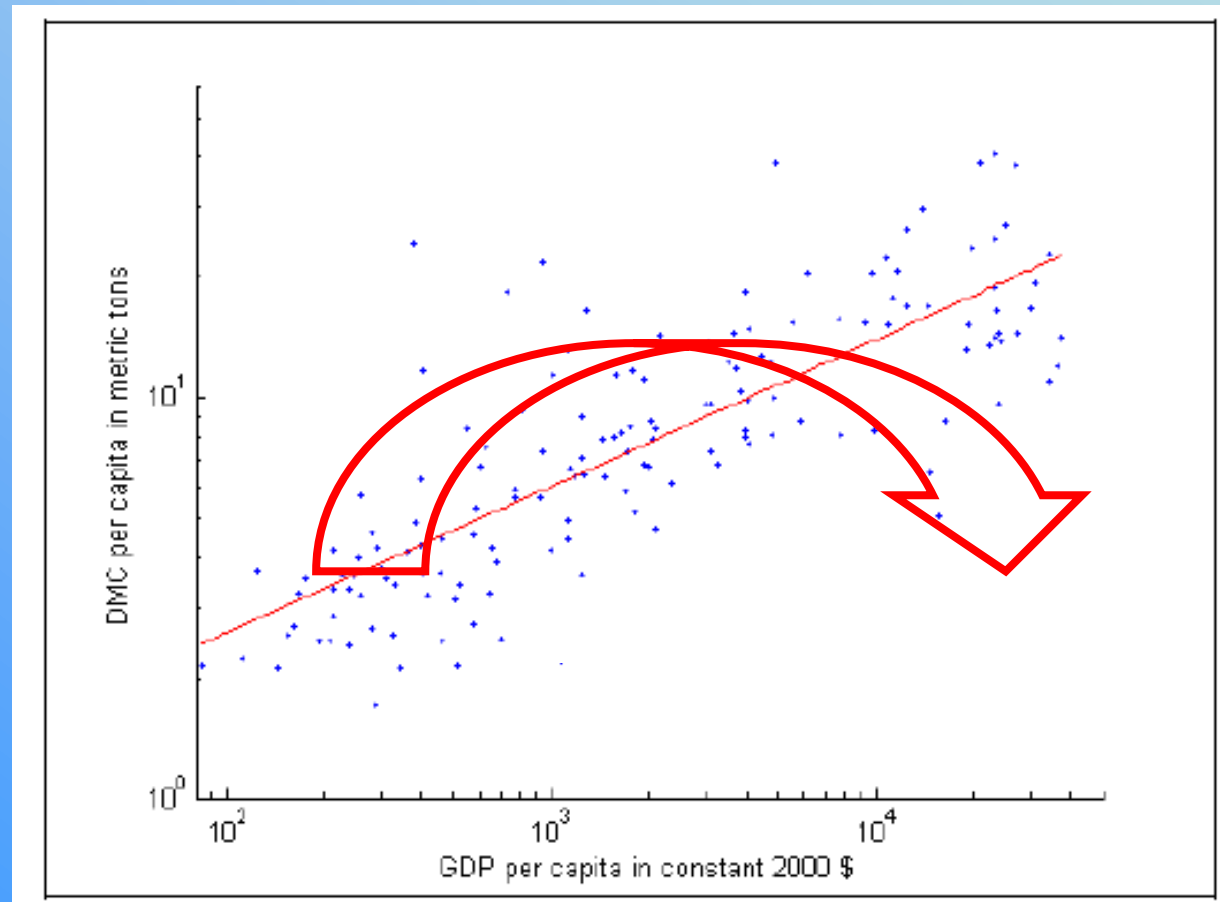
The Global South typically wants **relative** decoupling, and the North should aim at **absolute** decoupling.



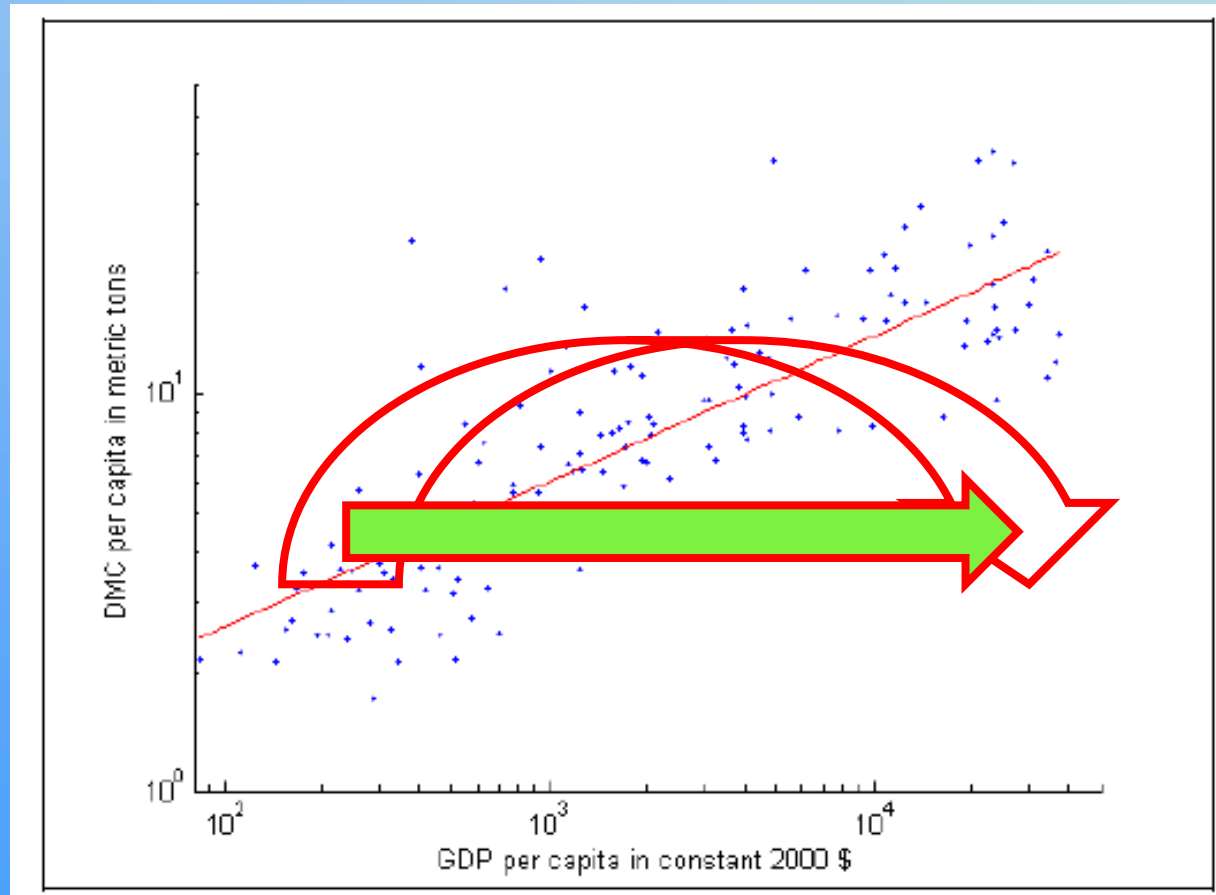
The classical origin of the decoupling idea: The Kuznets-curve of local pollution.



Creating the Kuznets Curve for resource use means intentional increase of resource productivity

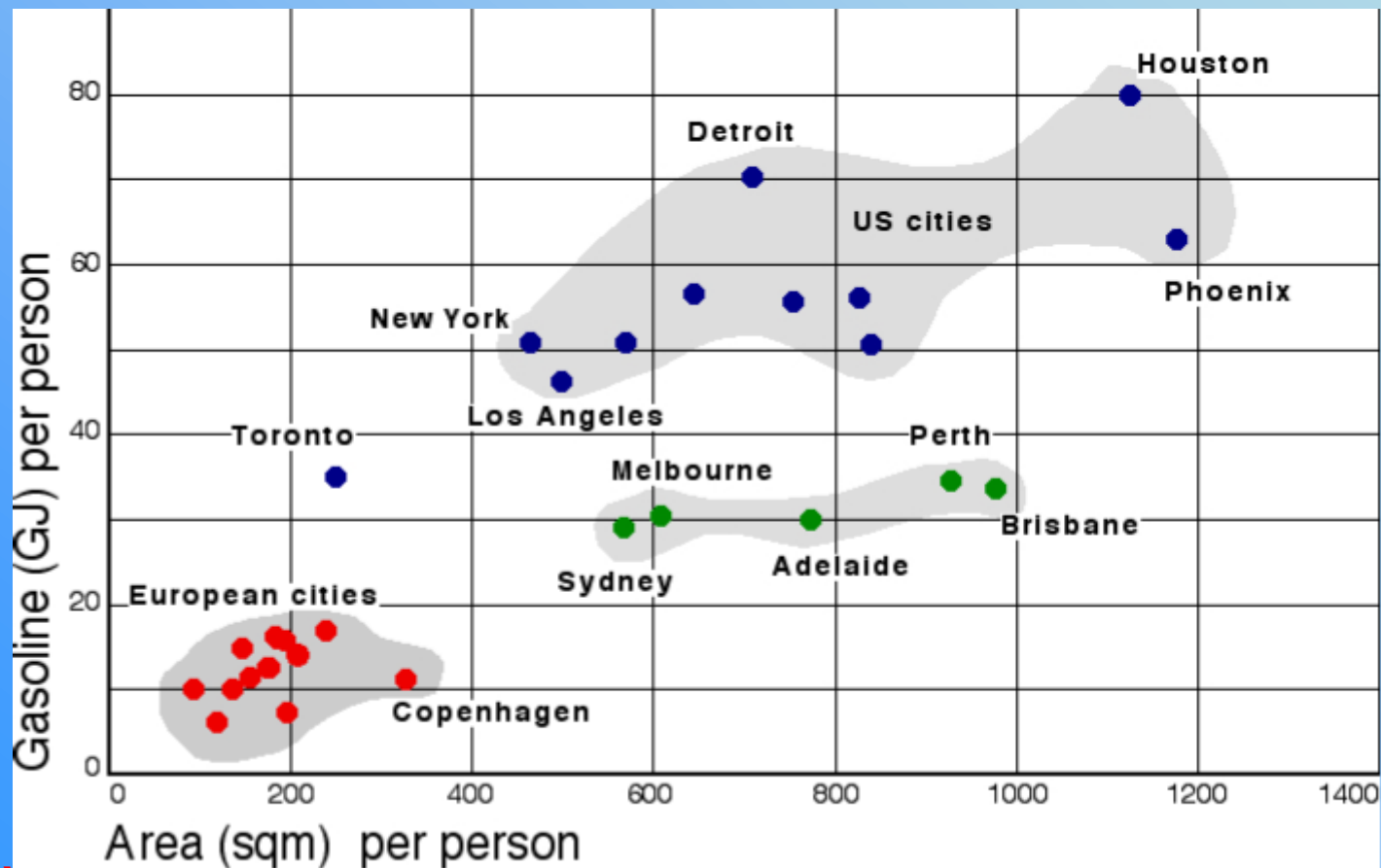


... and assist developing countries to tunnel through



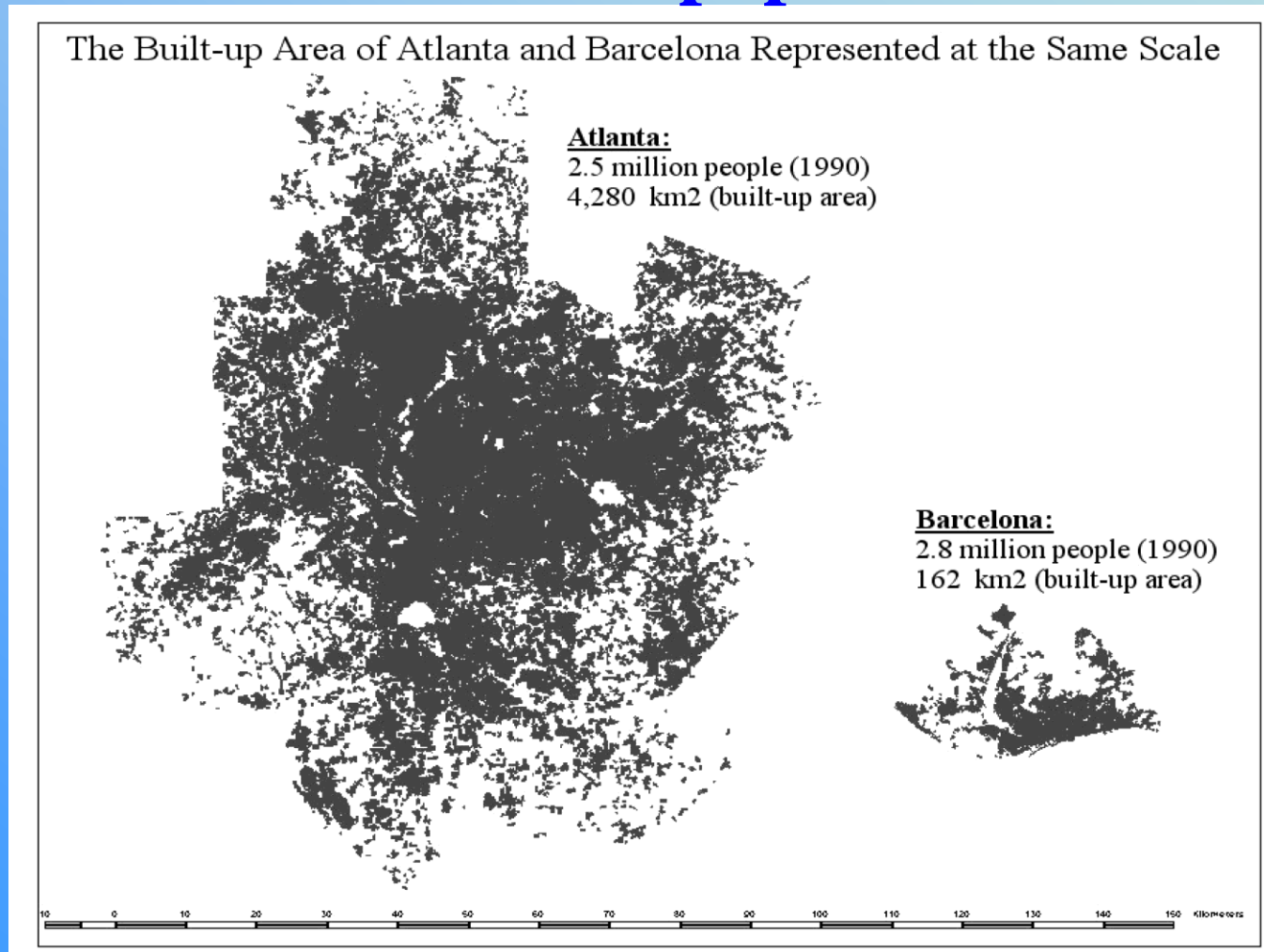
The design of a city's built environment, its land area and land use will affect its urban ecological footprint.

Urban densities and private transport

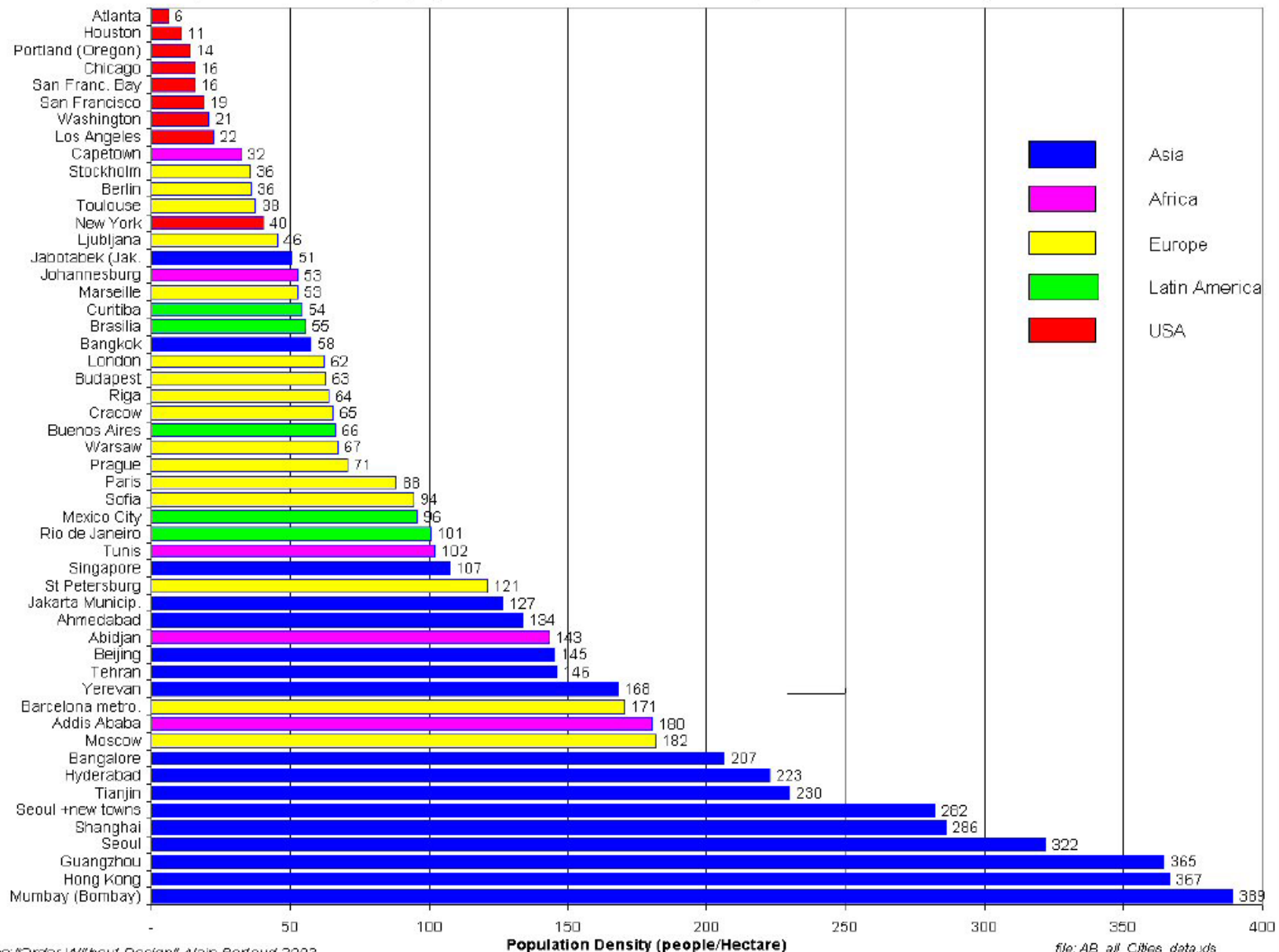


Atlanta is 25 times larger than Barcelona, but has a smaller population

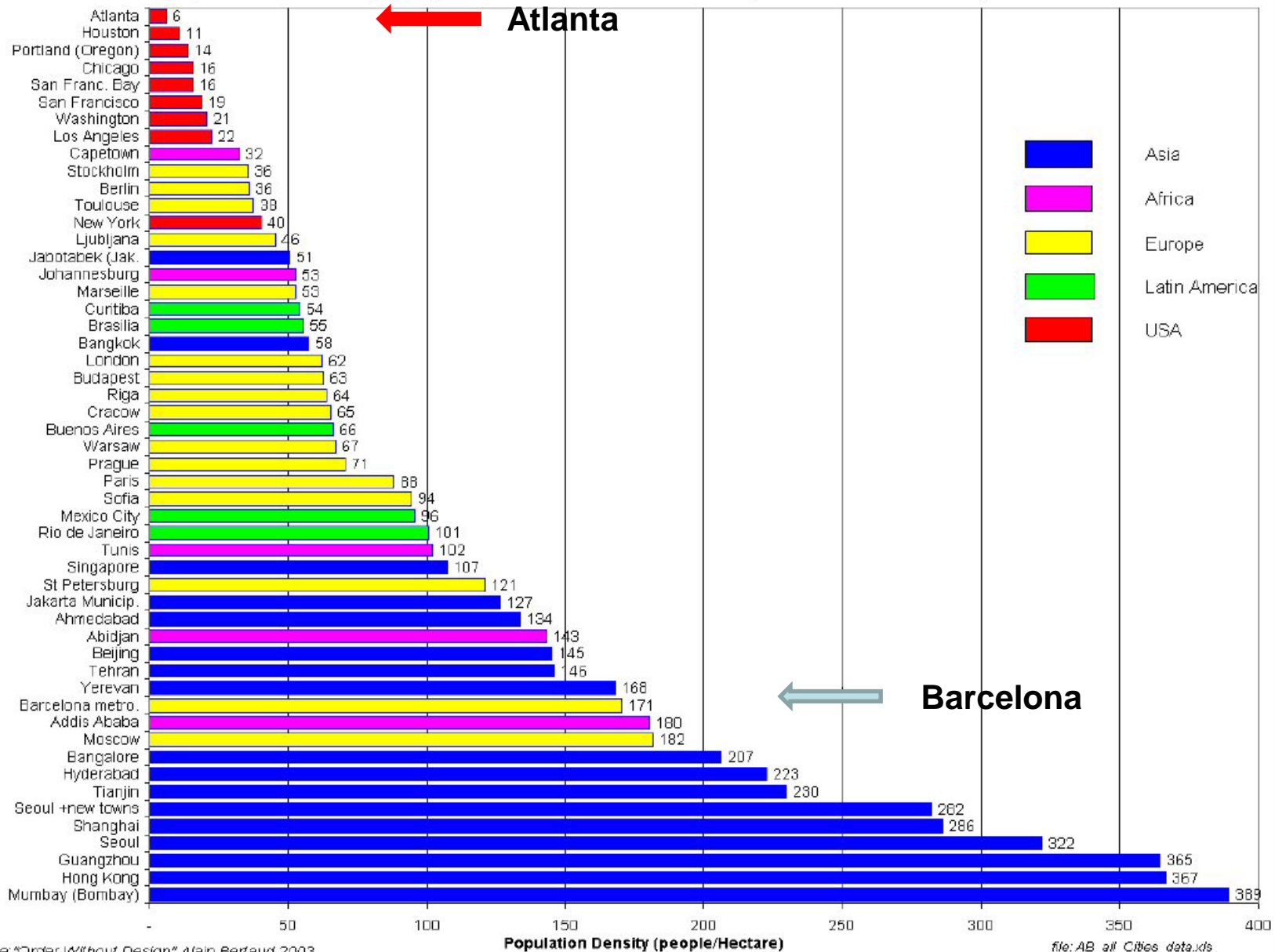
Ich danke Geoffrey Heal für die Überlassung des Bildes



Comparative average population densities in built-up areas in 49 metropolitan areas



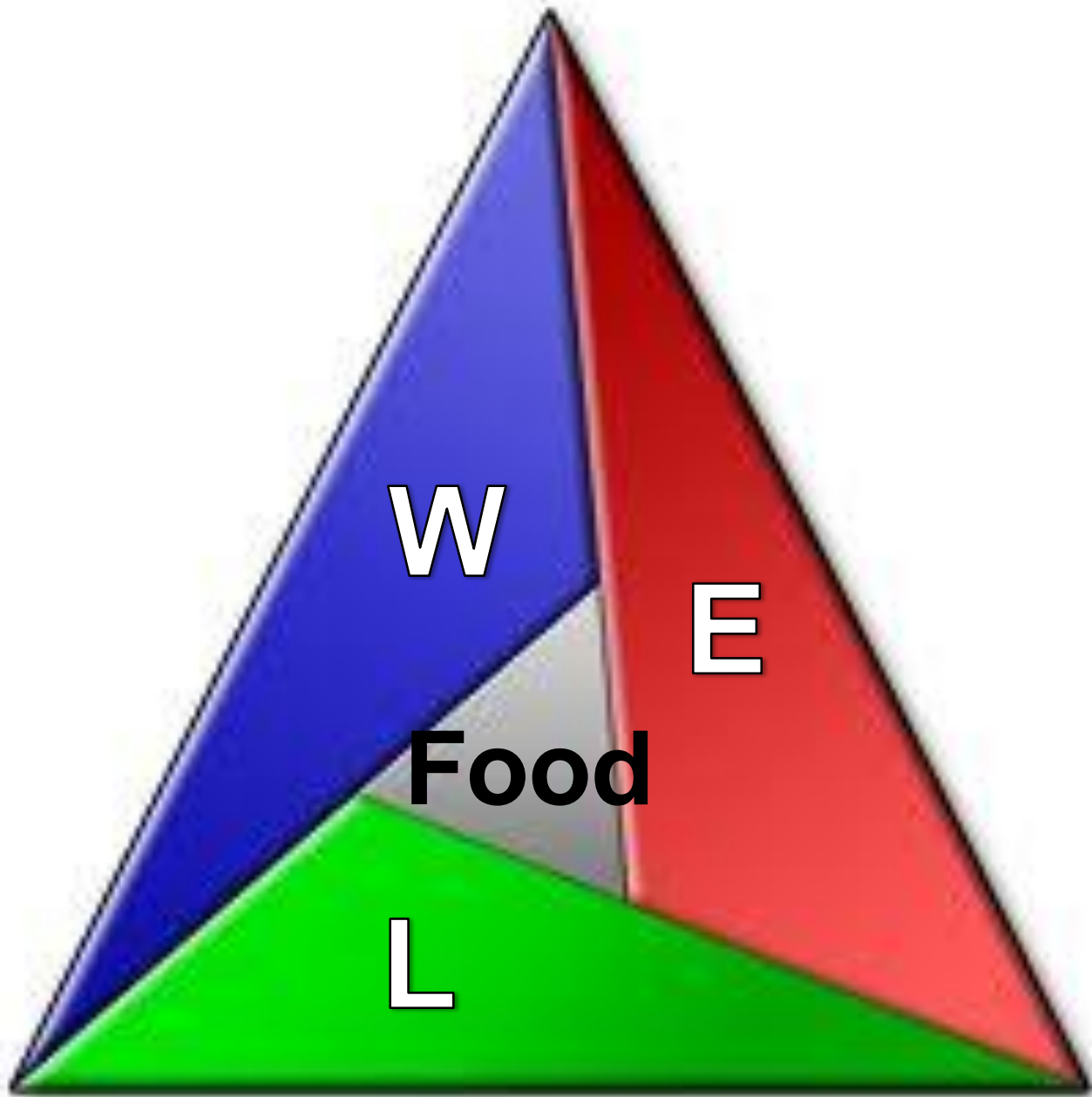
Comparative average population densities in built-up areas in 49 metropolitan areas





Development Alternatives





The Nexus:

Water

–

Land

–

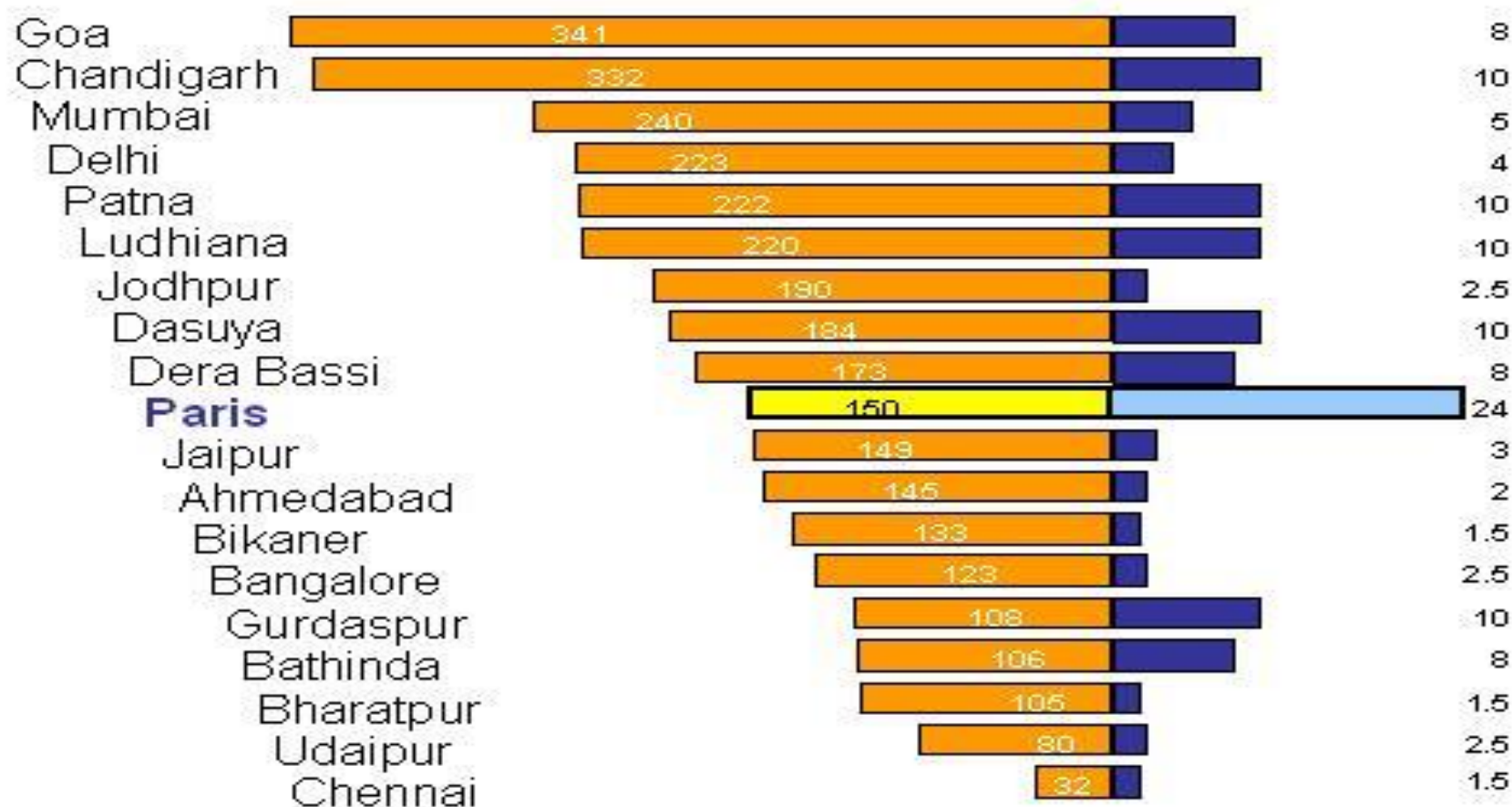
Energy

–

Food



Per capita lpd vs. hours of supply/day



Source: Data collected from the water boards or utilities



6.5 Billion Dollars

+ 300 Million Every Year



Development Alternatives



Development Alternatives

**0.7 Billion Dollars -
One Time Investment**

Urban Agriculture





McKinsey Global Institute



April 2010

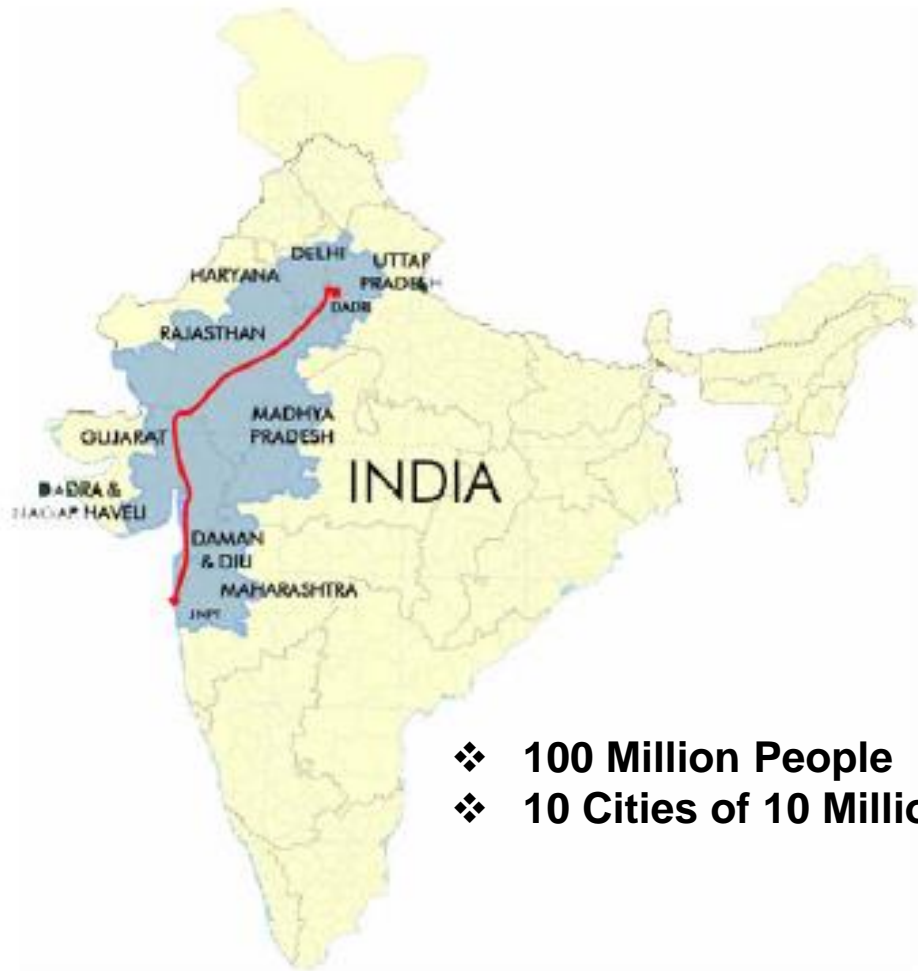
India's urban awakening:
Building inclusive cities,
sustaining economic growth

PERSPECTIVE PLAN

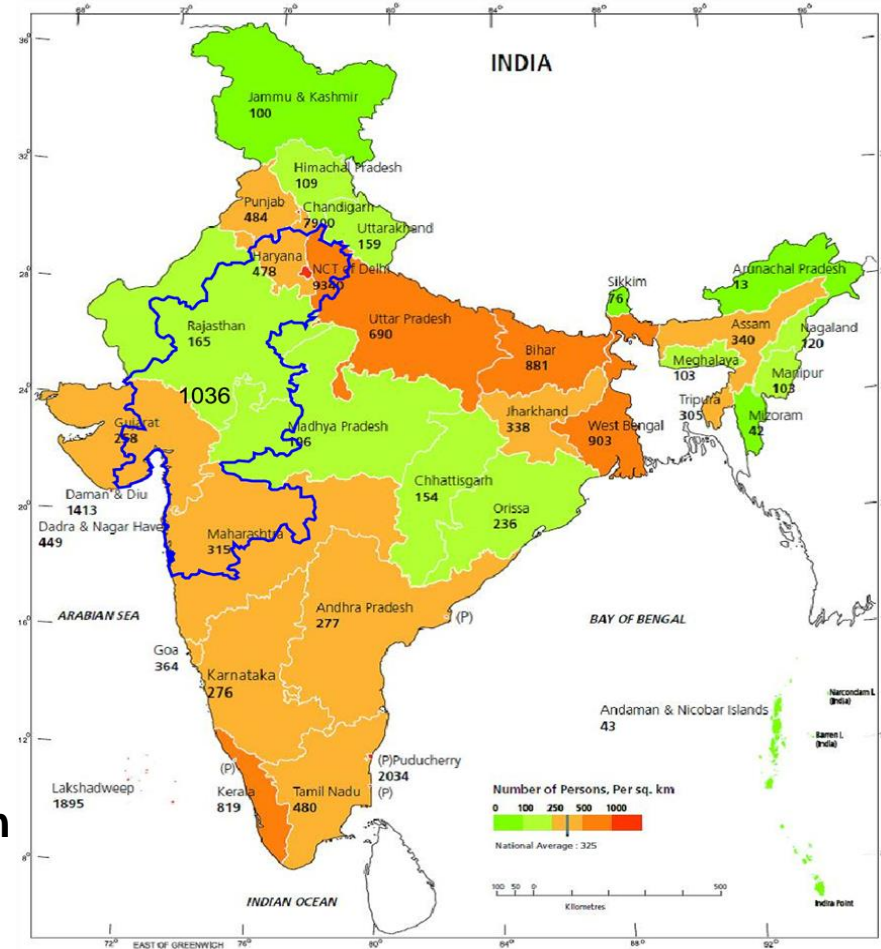
DELHI MUMBAI INDUSTRIAL CORRIDOR



VOLUME -I



- ❖ 100 Million People
- ❖ 10 Cities of 10 Million



POPULATION DENSITY

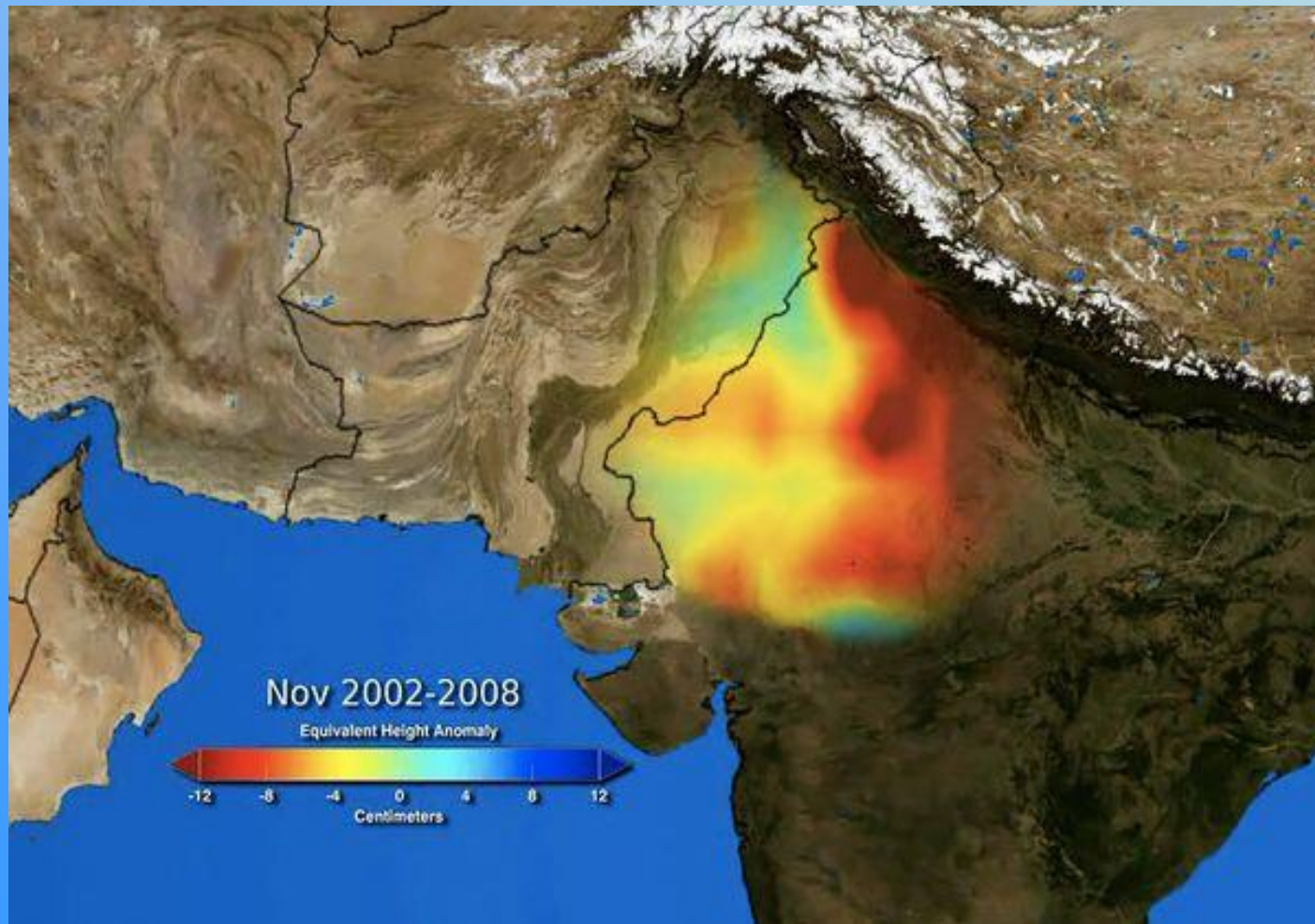


Development Alternatives

- One of McKinsey's 19 Industrial Corridors
- DMIC Cost ~ \$ 500 Billion ?

WATER

Groundwater levels in NW India dropping at an average of one metre every three years.





Policies and Investments

- **Job Creation with Mini Enterprises**
- **Invest More in Hinterland**
- **Strengthen Local Governance**
- **Appropriate Technology Choice**
- **Market and Public Infrastructure Mix**



City Categorization

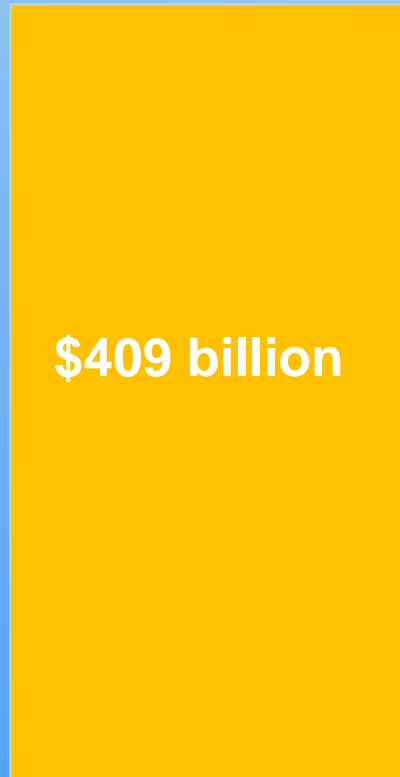
	Examples	infra	Size
Old Cities (North)	Berlin, Paris, Philadelphia, Amsterdam	retrofit	<2-5 million
Mega Cities	Shengzhen, Lagos, Sao Paulo, Tokyo	Think-as-we-build: BAU or Beyond	>10 million
Middle sized developing country cities	Capetown, Chandiragh	Easier to install new infra	1-3 million
Incremental Cities	Added on to many fast growing cities, Addis,	Accept&Improve	>5 million
New Eco-cities	Songdo, Masdar	Purpose built	1 million



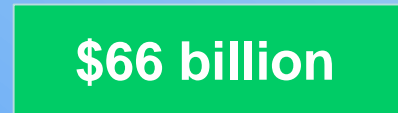
Sustainable City Management and the Urban Ecological Footprint



Subsidizing the Wrong Thing



**FOSSIL
FUEL
SUBSIDIES**



**RENEWABLE
ENERGY
SUBSIDIES**







Progressive Transport Policies



(Congestion Charge London)



Development Alternatives

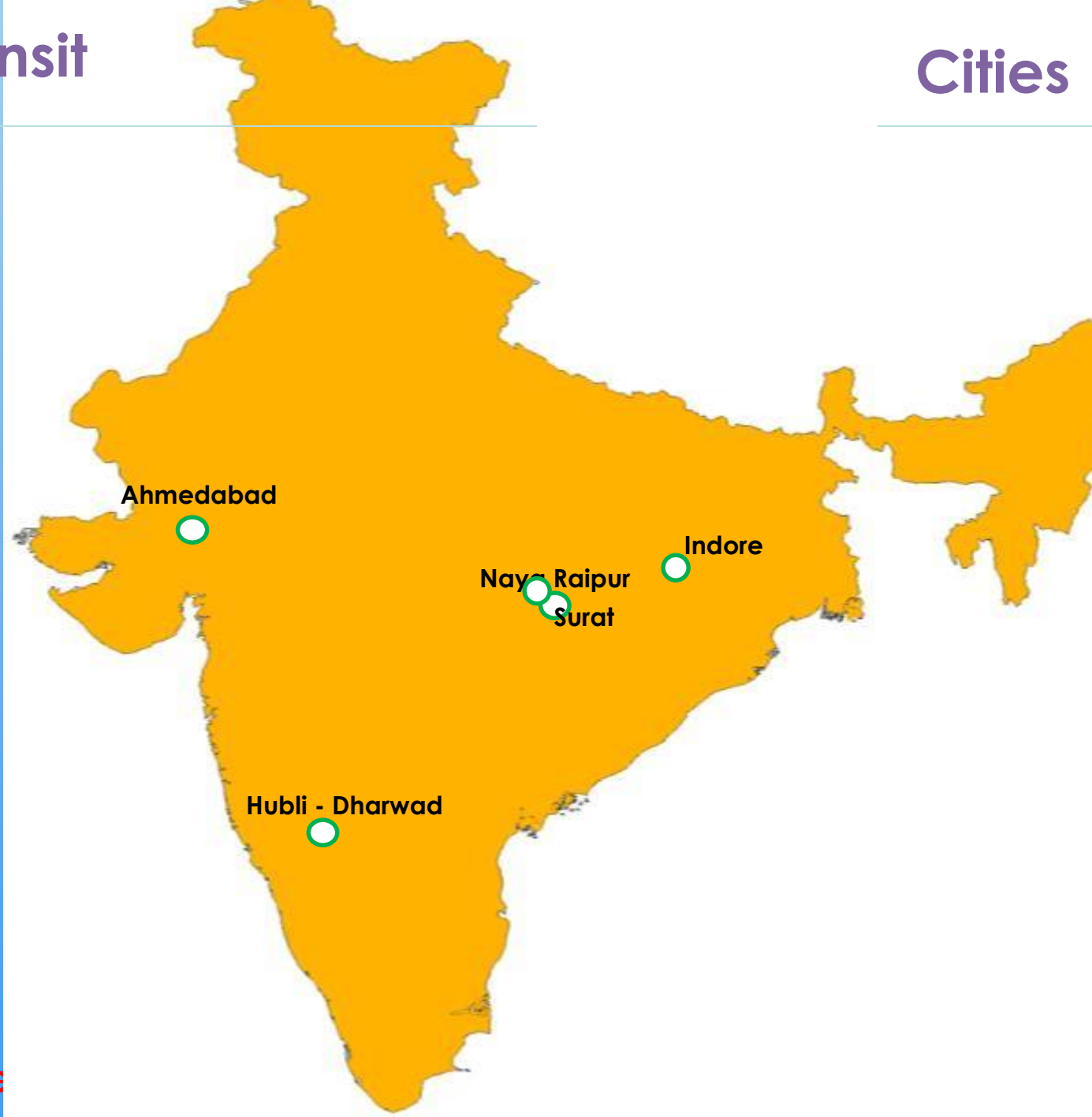


WORLD RESOURCES INSTITUTE

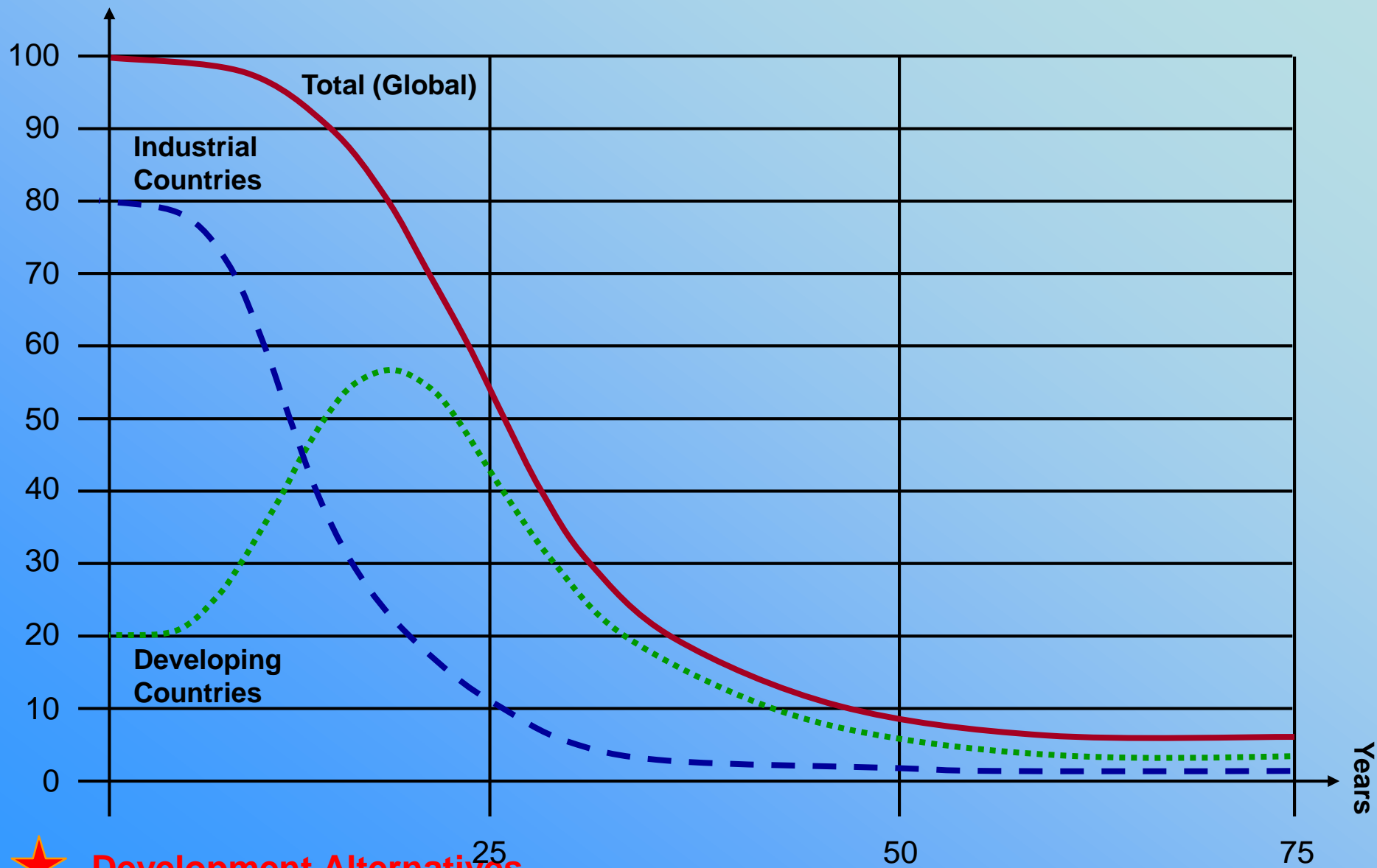
AHMEDEBAD (JANMARG)

India's 1st Complete BRT





Consumption of Materials

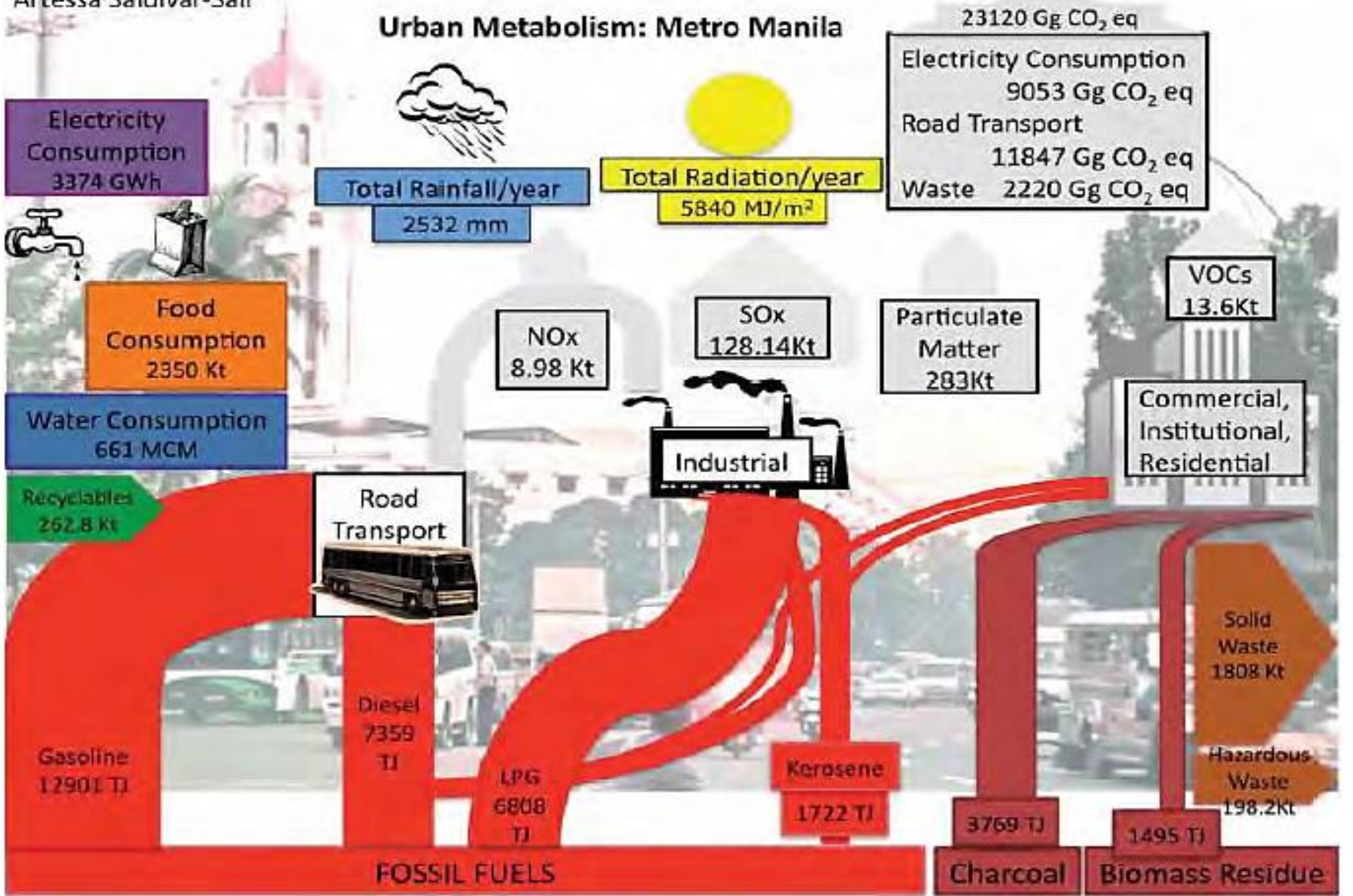


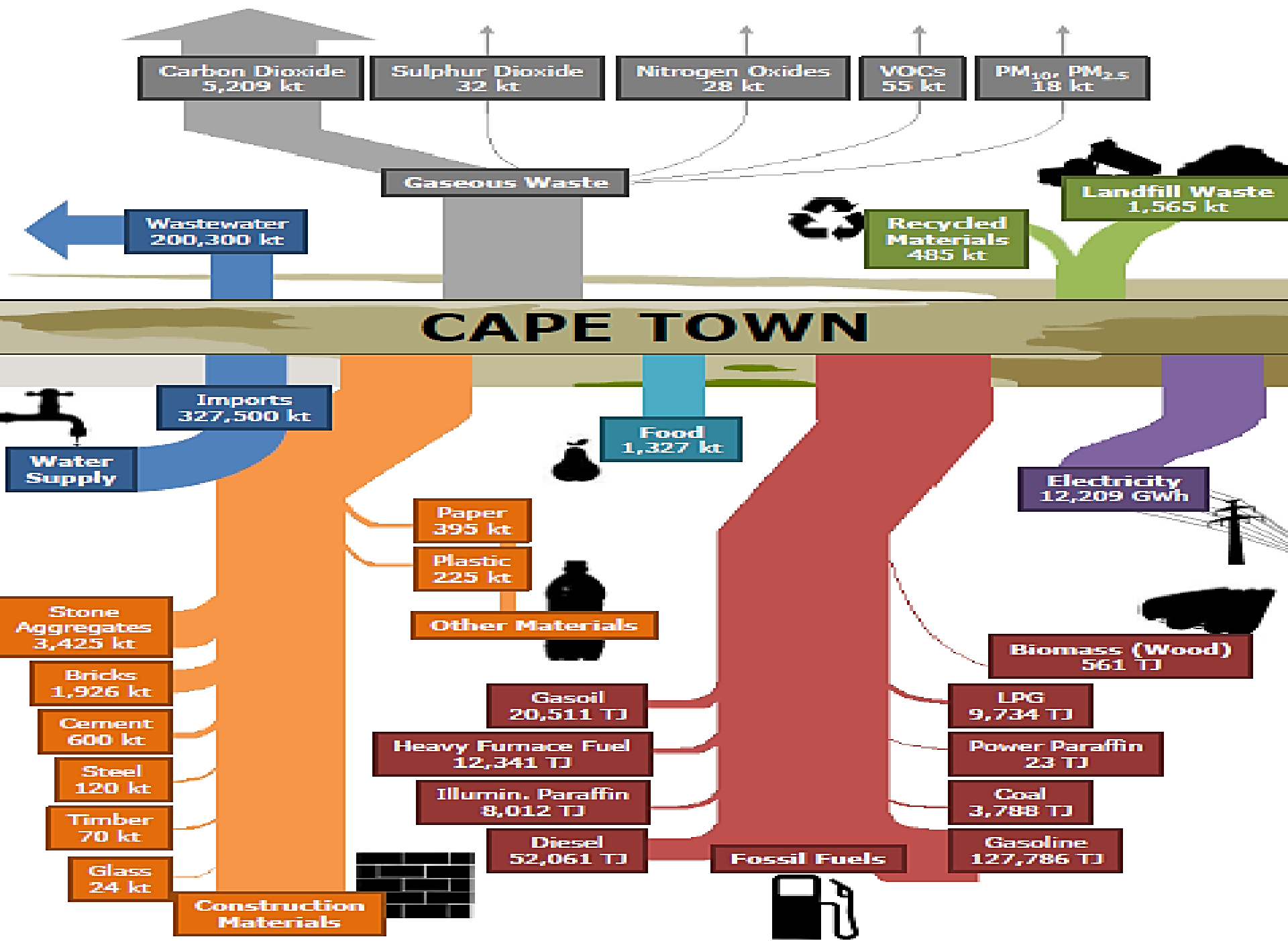






Artesa Saldivar-Sali







Urban planning uses

land environment architecture growth benefits uses

management strategic methods many university environment landscape renewal larger aspects examined zones heritage

integration long-term signposts strong dense often different urbanized respect term countries current enforced increased ages explore density pre-dark yet

new like guidance freedoms safety thought visual discipline generate materials conventional adapting key Planners now

disciplines result traffic synergy environmental infrastructure packaged debates transport

long inner detailed

substantial deals smart signs using origins role citation

geographic municipal distinguishing use human-made tensions existing beautiful developed less

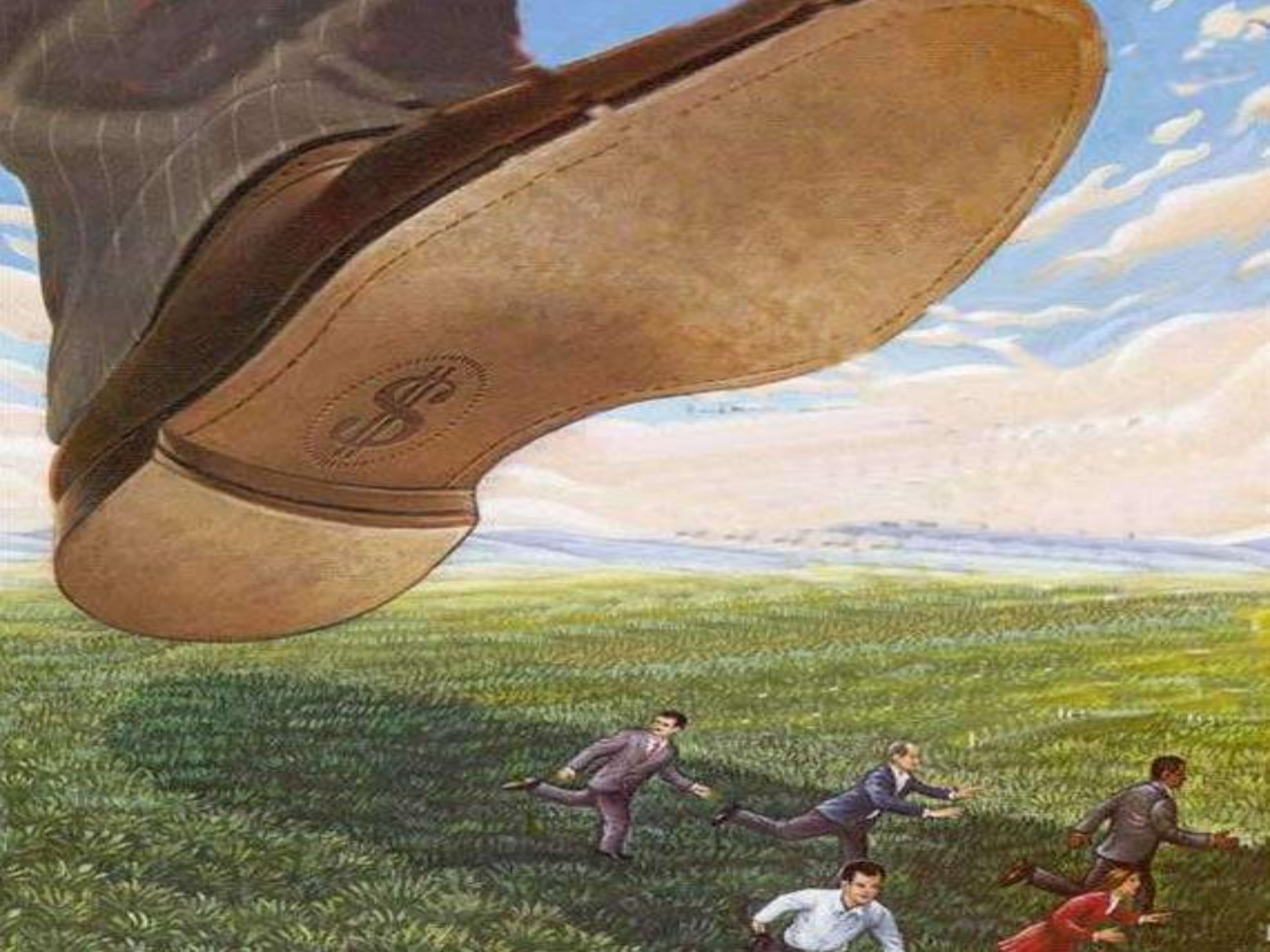
needed excessive planned era important local contemporary communities amongst city building clutter

pace hazards backlash

regeneration historically development character sizes managing

pace hazards backlash

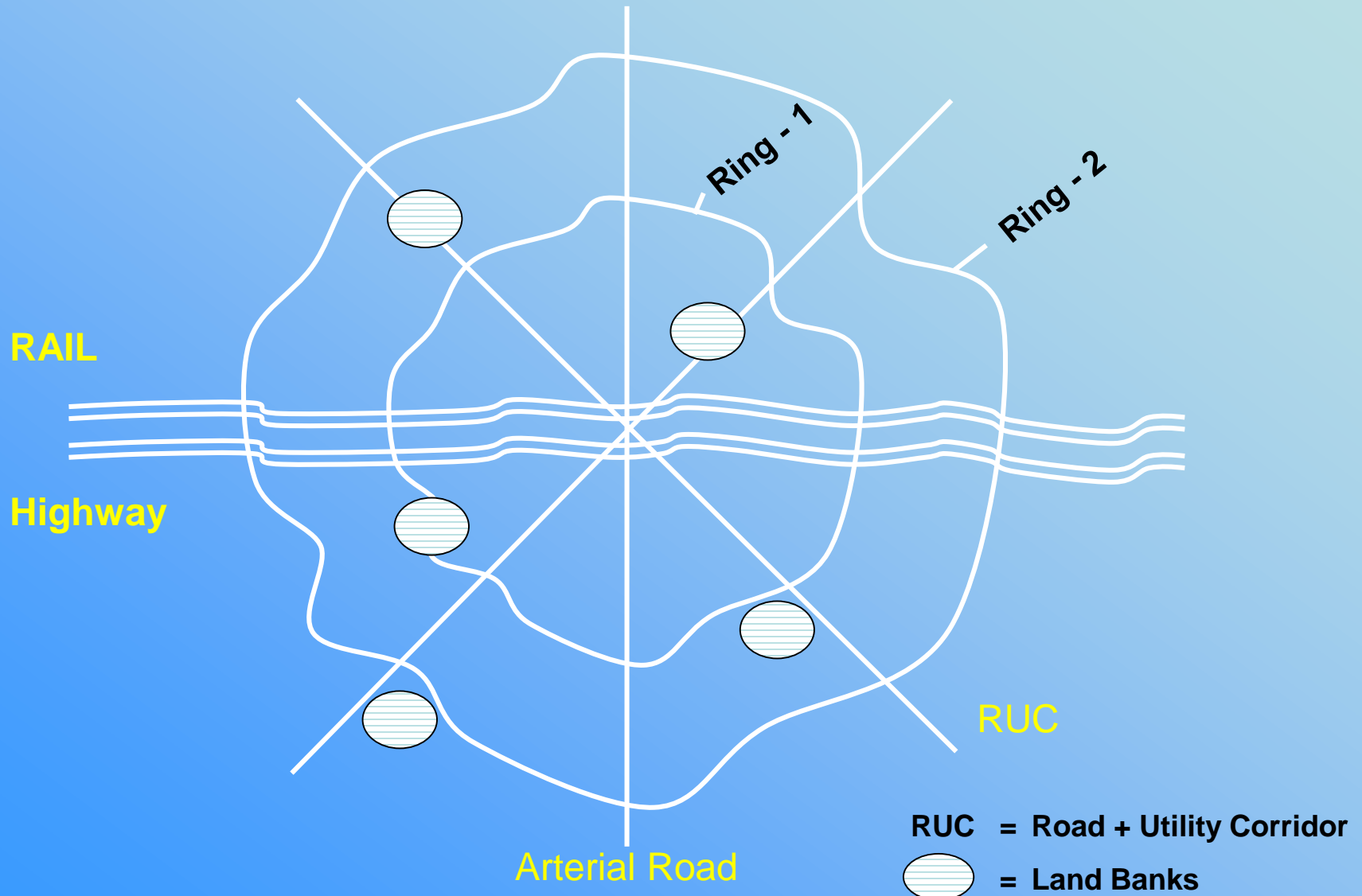




IN A SUSTAINABLE CITY
A PEDESTRIAN
IS THE KING!



Create Arteries and Lungs



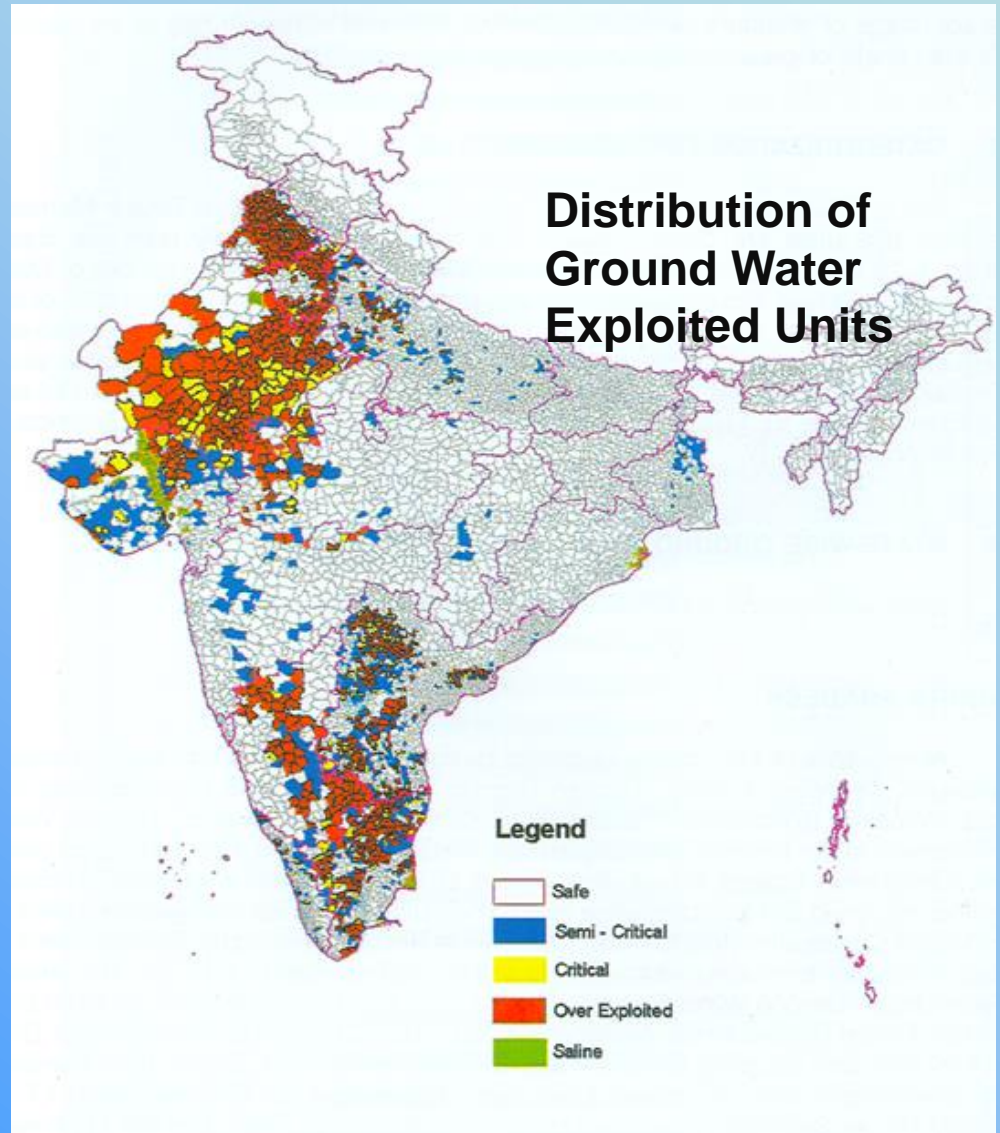
RURAL RESILIENCE

NOW

- Green Revolution has reached its limits
- 71% rural
- 42% BPL

2030

- 885m rural (60%)
- 30% of GDP
- Most vulnerable

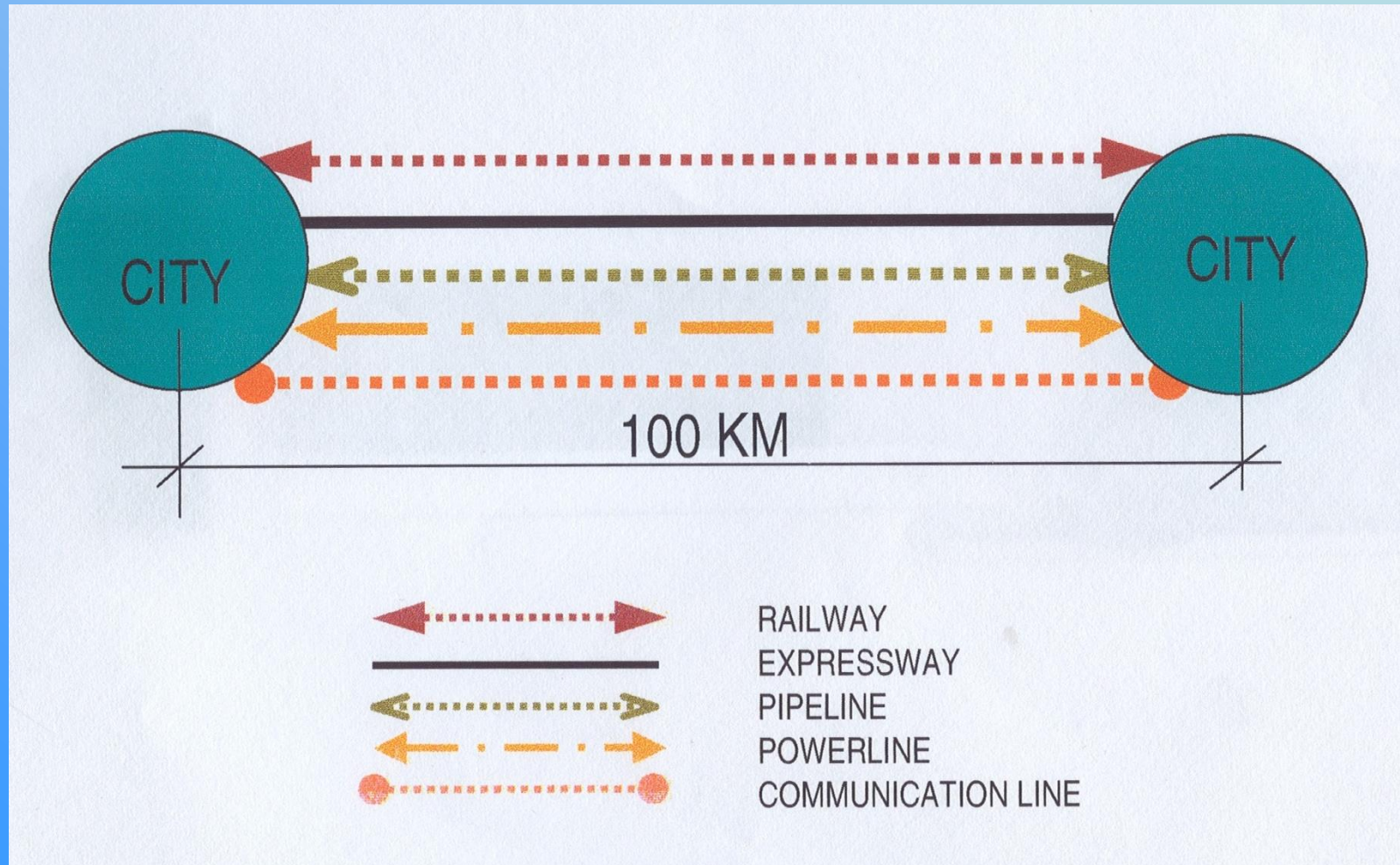


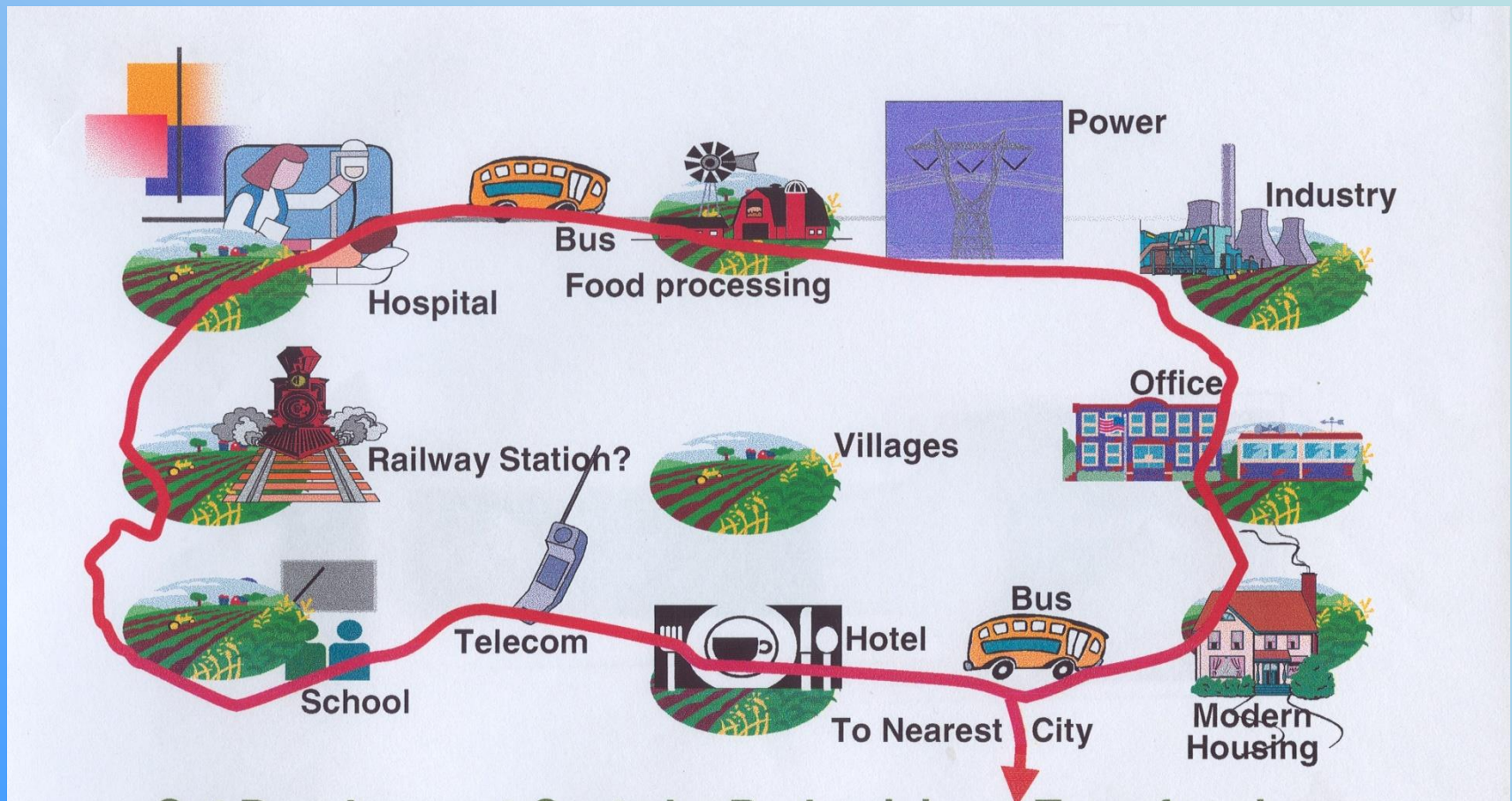
PURA

- **A bankable, commercial venture**
- **Rural infrastructure is less expensive**
- **Needs sizeable market for viability**



Infrastructure Spinal Corridor



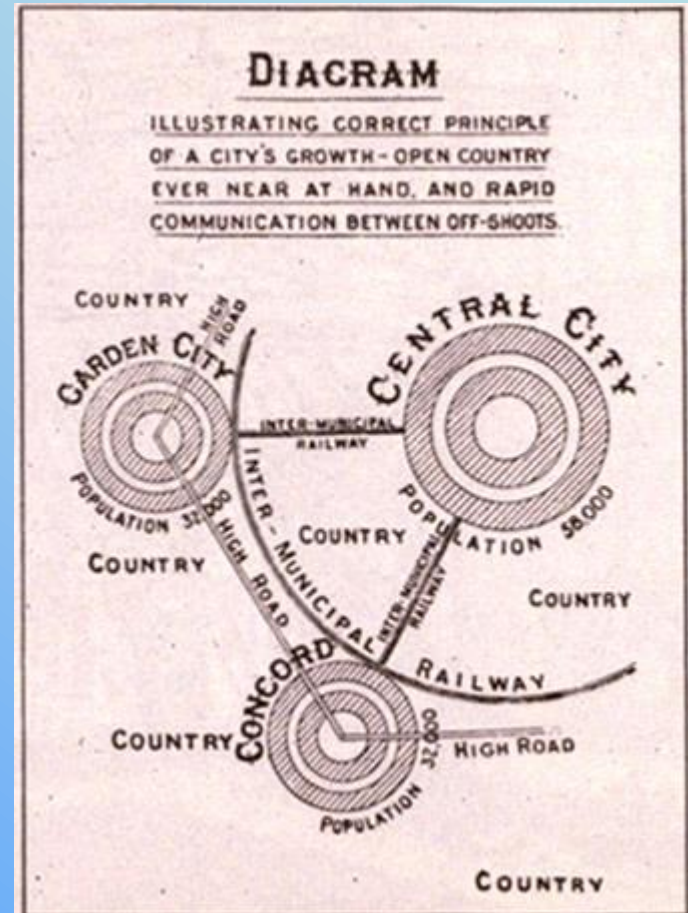
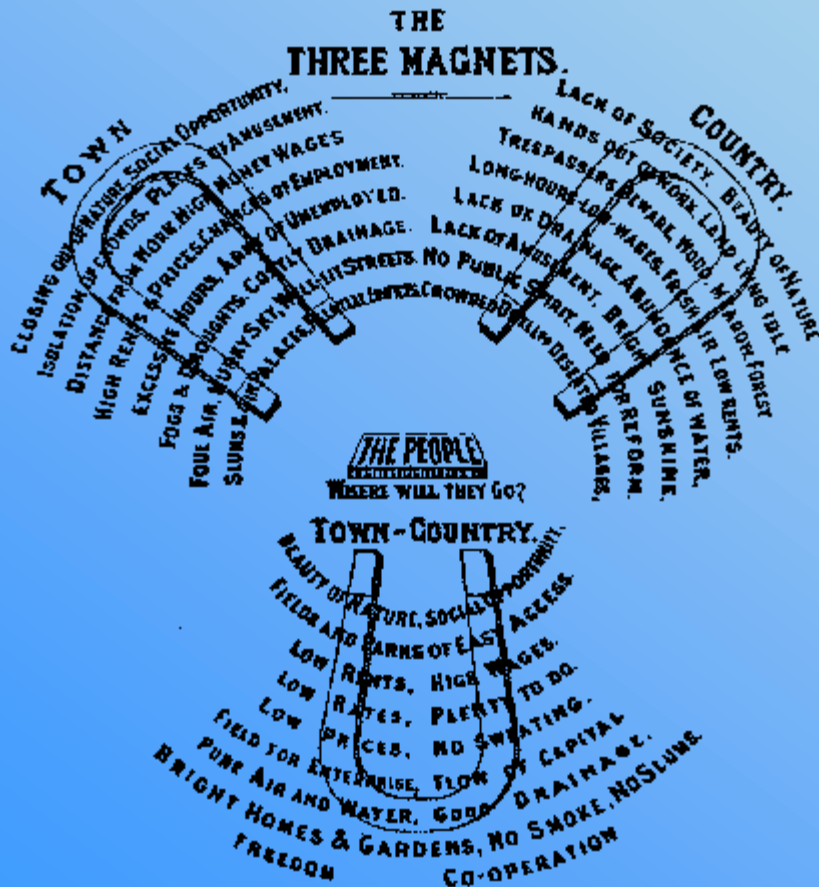


**Cut Development Costs by Rurbanising – Transforming
A Loop of Villages into a Low-cost Virtual Town
– *With Potential To Grow Fast***



Development Alternatives

Garden Cities and Model Towns





Urbanisation resource + DA ...

How tree huggers can save f...

Welcome to Foresight | B... x

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☐ Any words ☒ All words ☐ Exact phrase

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II

The future of cities blog

In the first Future of Cities blog post Sir Mark explains what the project is about and what experts in Cambridge have to say about it. [Read his post](#).



1 The future of manufacturing

2 The future of cities blog

3 The future of demographic change

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Our role is to help government think systematically about the future

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Our work makes a critical contribution to meeting important challenges of the 21st century - such as food security, flooding and obesity.

Foresight reports directly to the Government Chief Scientific Adviser and the Cabinet Office. It is a part of the [Government Office for Science](#) within the [Department for Business, Innovation & Skills](#).

Current projects

- [The Future of Cities](#)
- [The Future of Demographic Change](#)

Future Cities



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About Us

We are the Future Cities Catapult, a global centre of excellence on urban innovation. A place where cities, businesses and universities come together to develop solutions to the future needs of our cities.

What's the big idea?

We're one of seven 'Catapults' launched by the UK's Technology Strategy Board. The aim for each of them is to become a world-leading innovation centre in its own specialist area.

As you can guess by the name, our Catapult is all about urban innovation. In particular, we're focussed squarely on the challenge of urban integration: how cities can take a more joined-up approach to the way they plan and operate. To improve quality of life, strengthen their economy and protect the environment.

What we do

Based in the heart of London, our role is to get people working together to solve real challenges faced by real cities right now.

Cities sharing what's worked for them in the past. Companies and universities working together. New innovations being road tested at scale. New solutions getting to market. Financiers, lawyers and city governments teaming up to remove barriers to innovation. The Future Cities Catapult is a neutral space where all this happens.

Latest News

08 NOVEMBER 2013

TEDx City 2.0

24 OCTOBER 2013

Open Data Sharing for Manchester

15 OCTOBER 2013

Future Cities Catapult at the Bristol Festival of Ideas

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25 NOVEMBER 2013



Additional Items

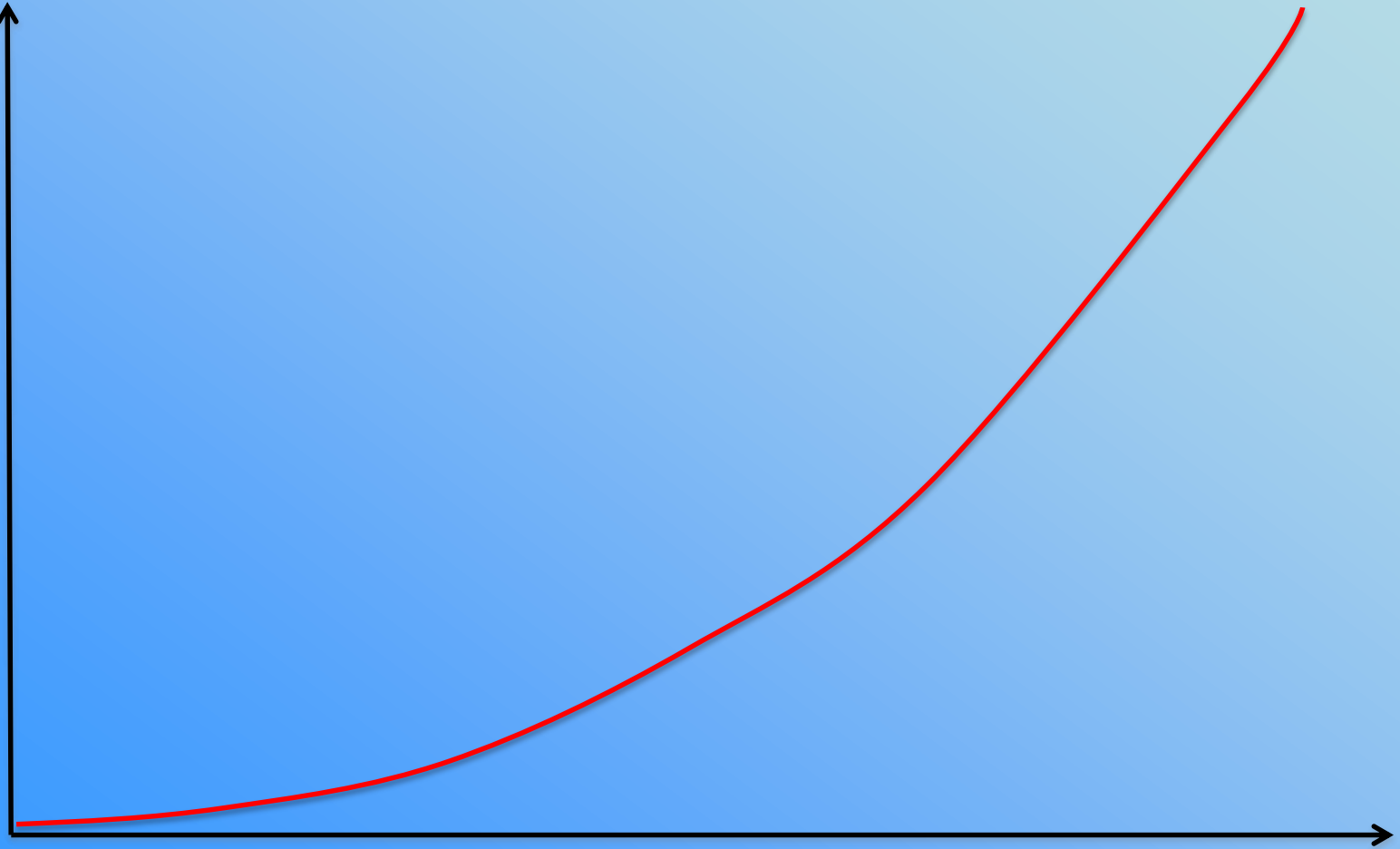
- Resilience and Natural Disasters
- Systemic Changes to Eliminate Corruption
- More on City AND Hinterland
- Landuse to conserve Croplands and Nature
- Old and New Cities
- Policies and Incentives
- Flexible Design to Minimize Lock-in
- Optimal Density – Vertical vs Horizontal
- Cyclists



Global Systems

Cost of Increasing Efficiency

Cost



Efficiency

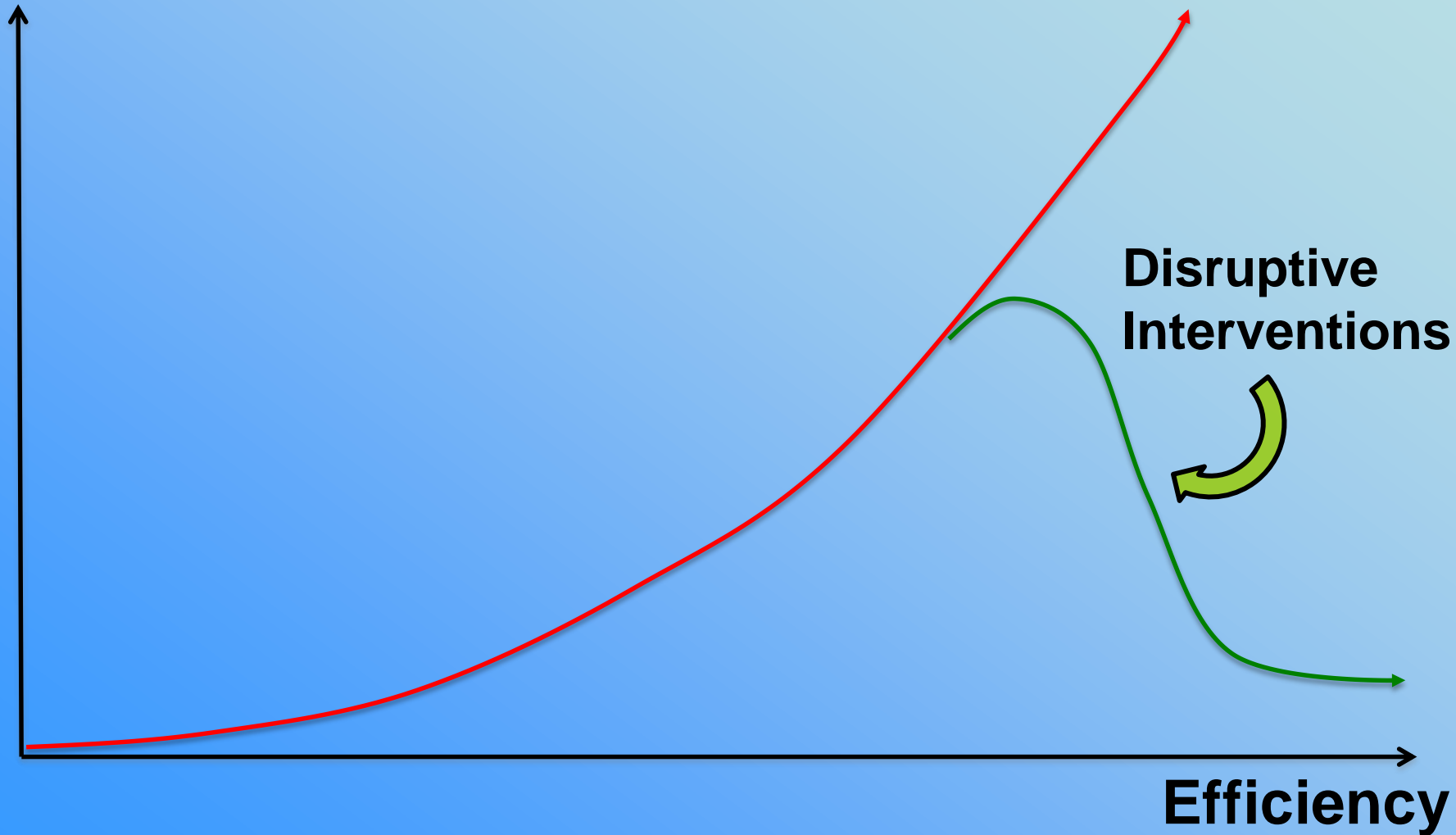


Development Alternatives

Global Systems

Transforming Efficiency

Cost

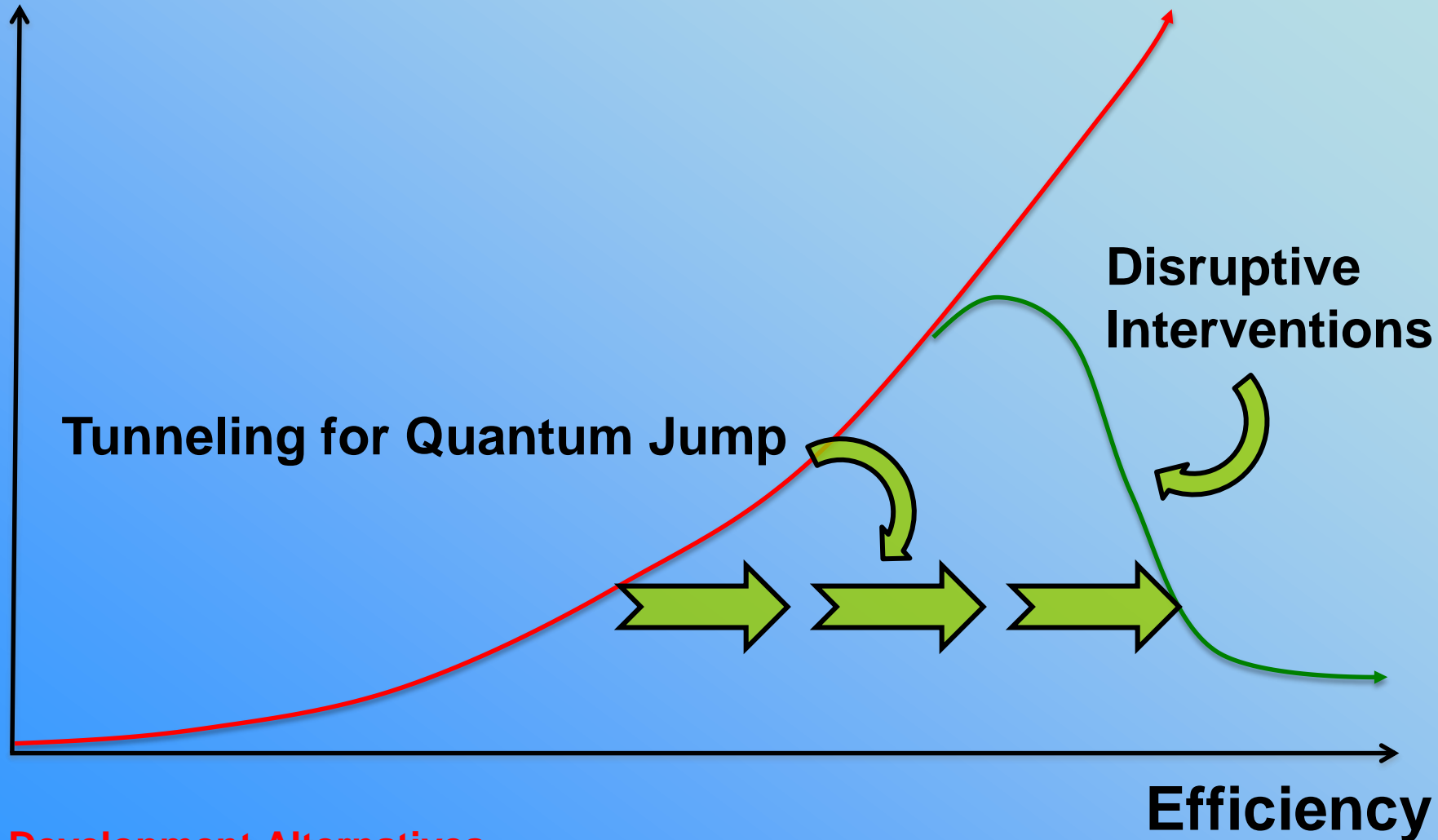


Development Alternatives

Global Systems

Shortcuts to Increasing Efficiency

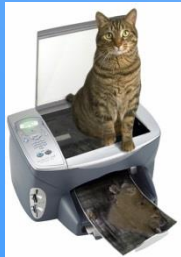
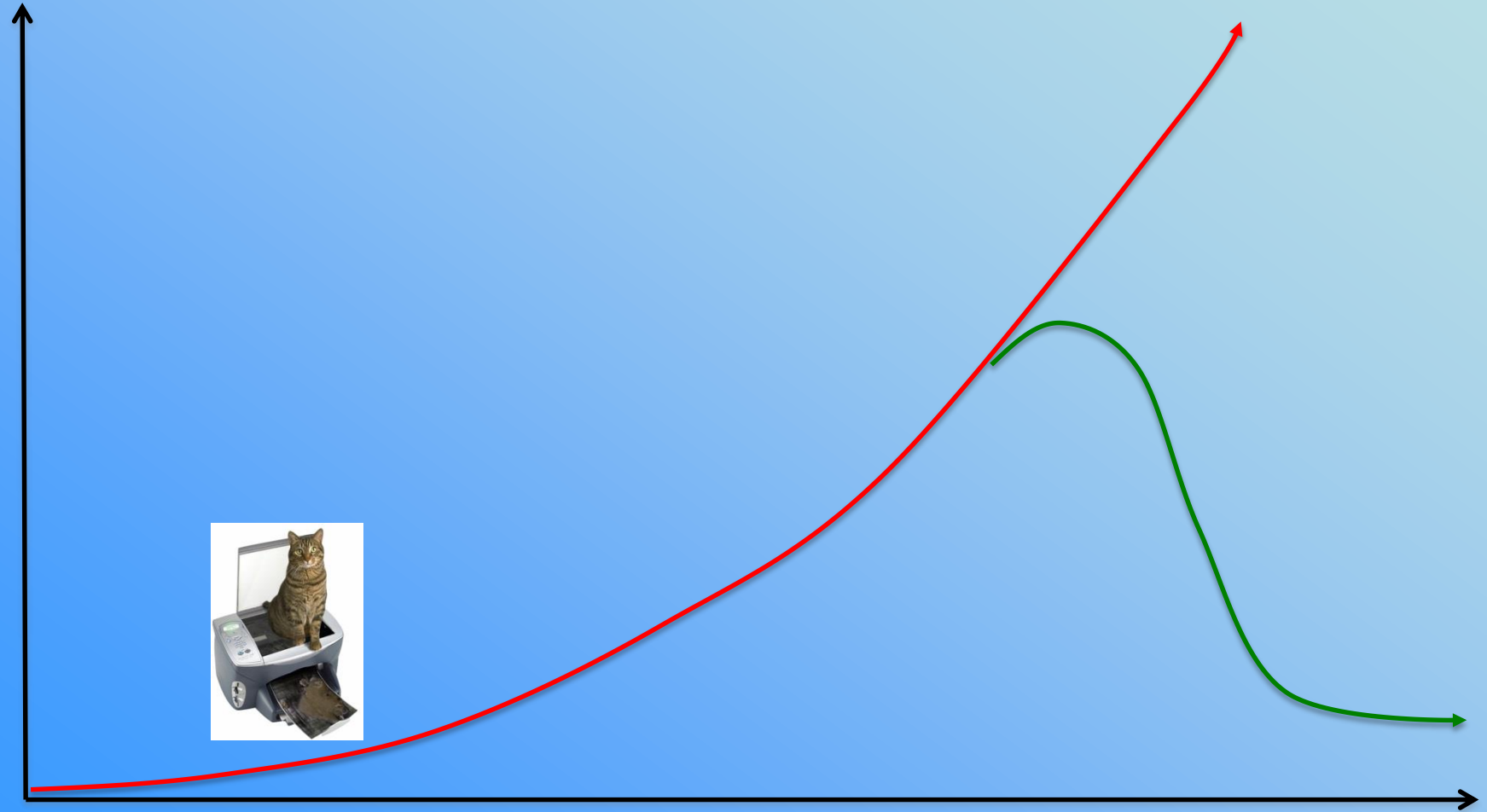
Cost



Global Systems

Approaches to Increasing Efficiency

Cost



Efficiency

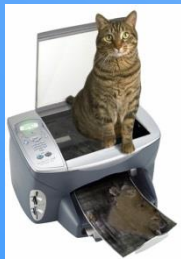
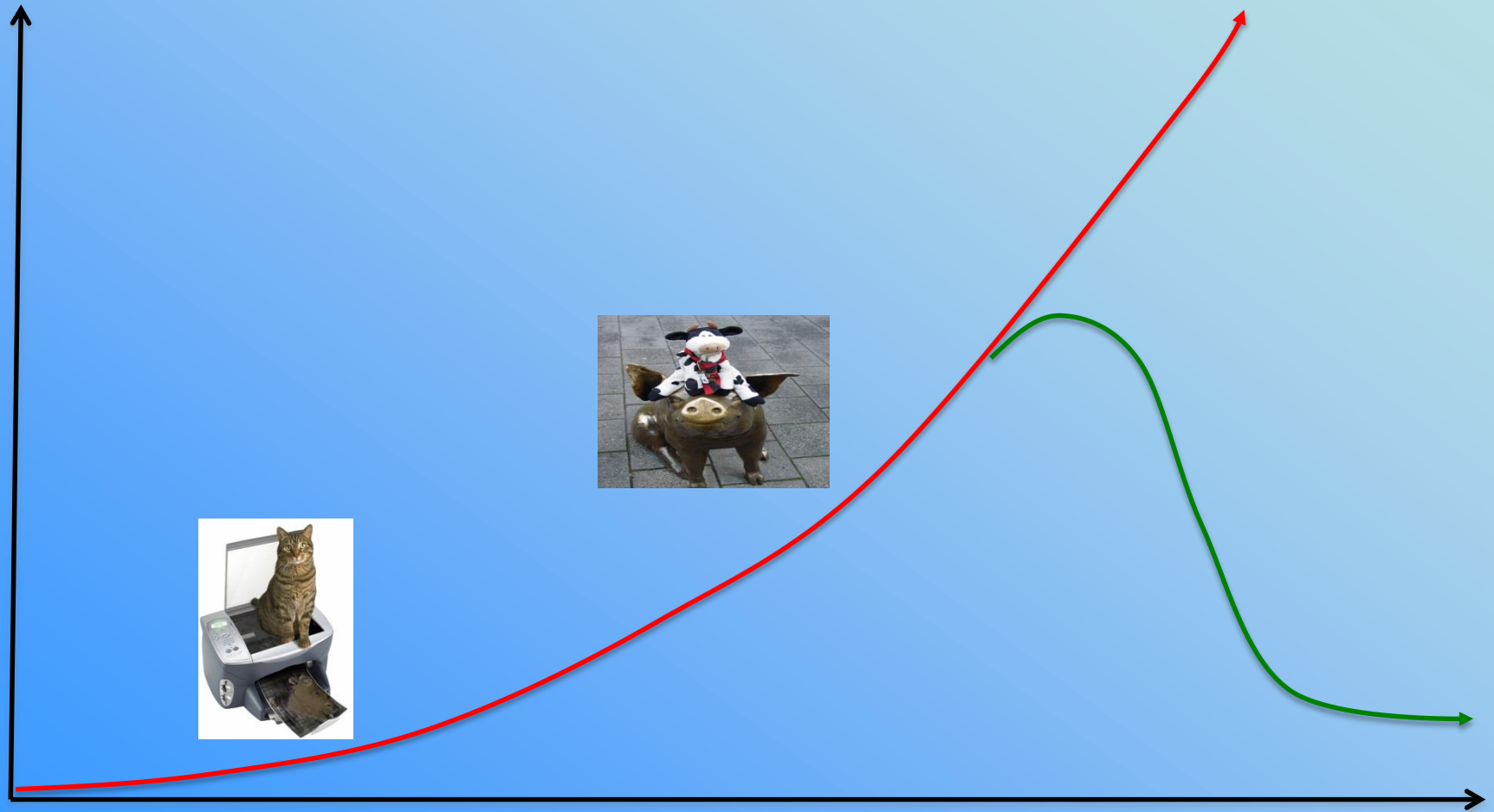


Development Alternatives

Global Systems

Approaches to Increasing Efficiency

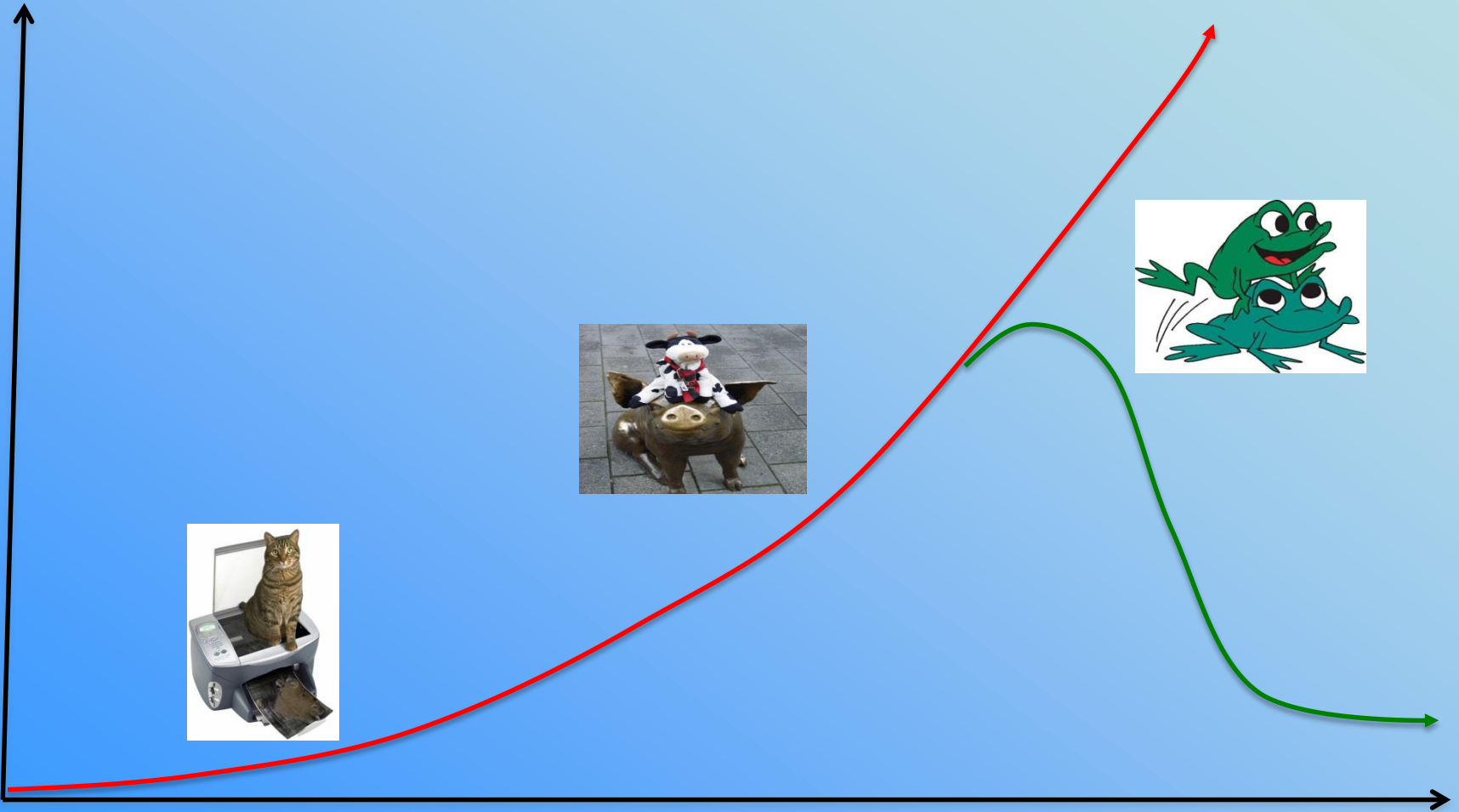
Cost



Development Alternatives

Efficiency

Cost



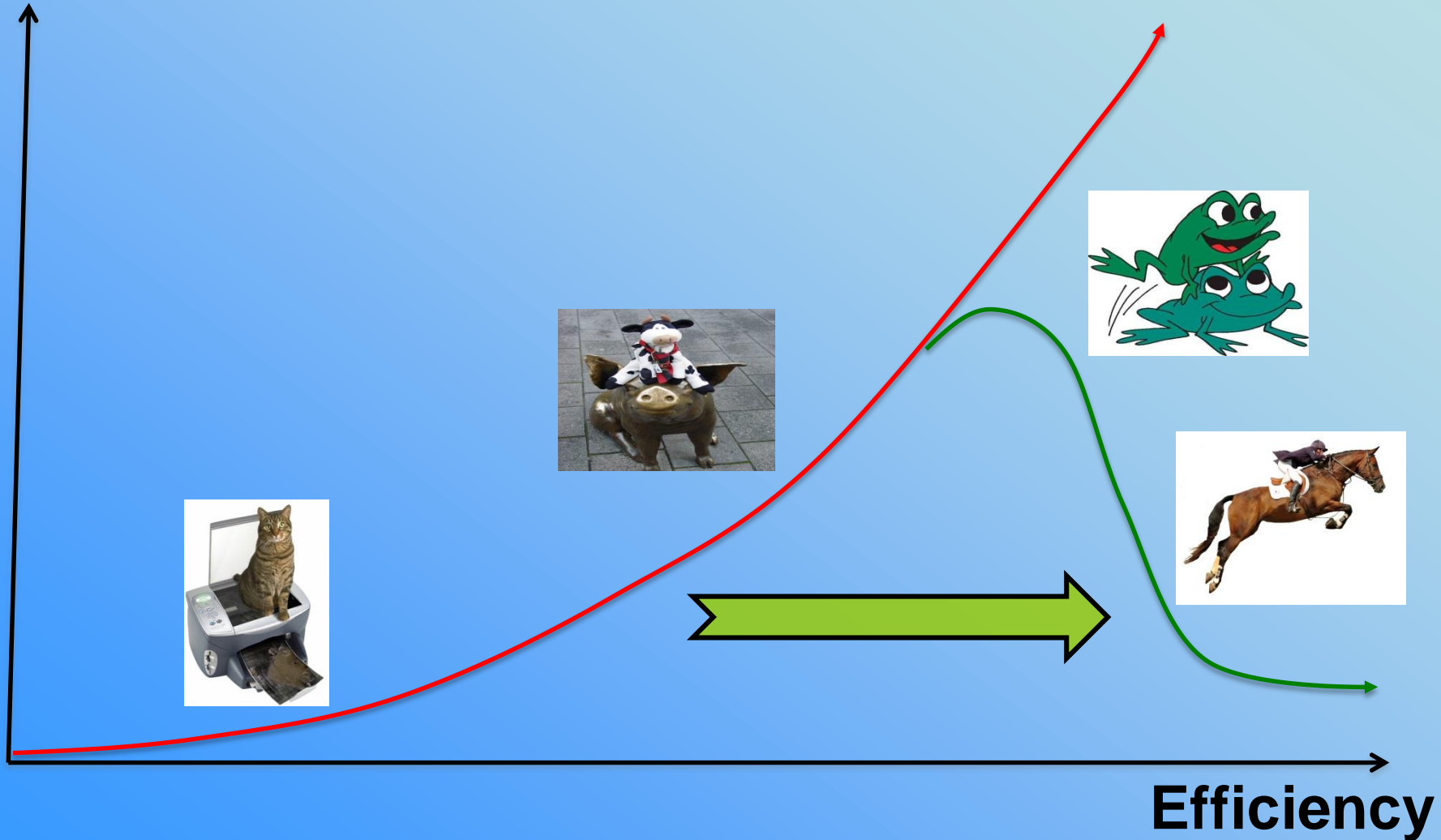
Efficiency



Development Alternatives

Societal Choices

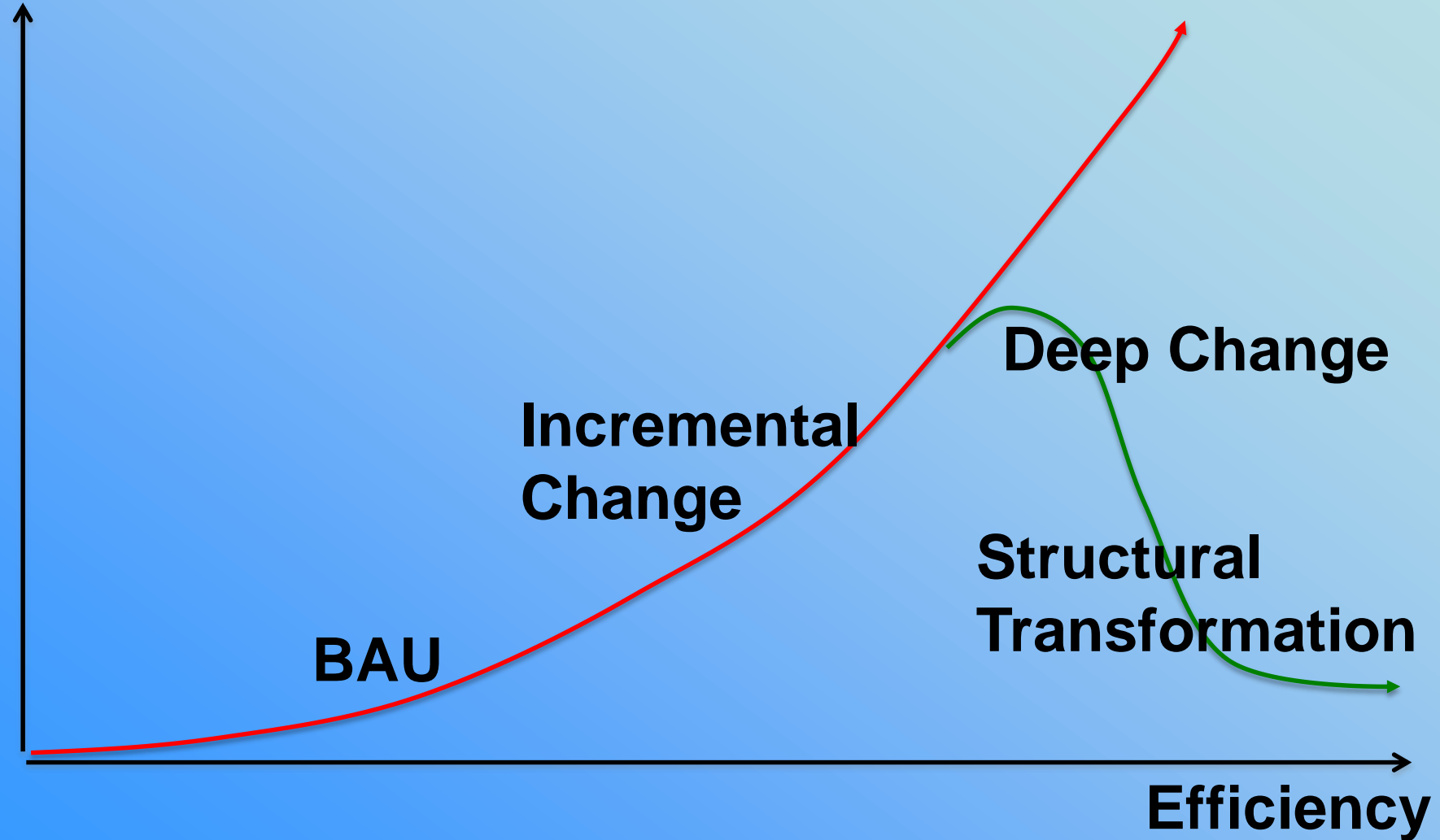
Cost



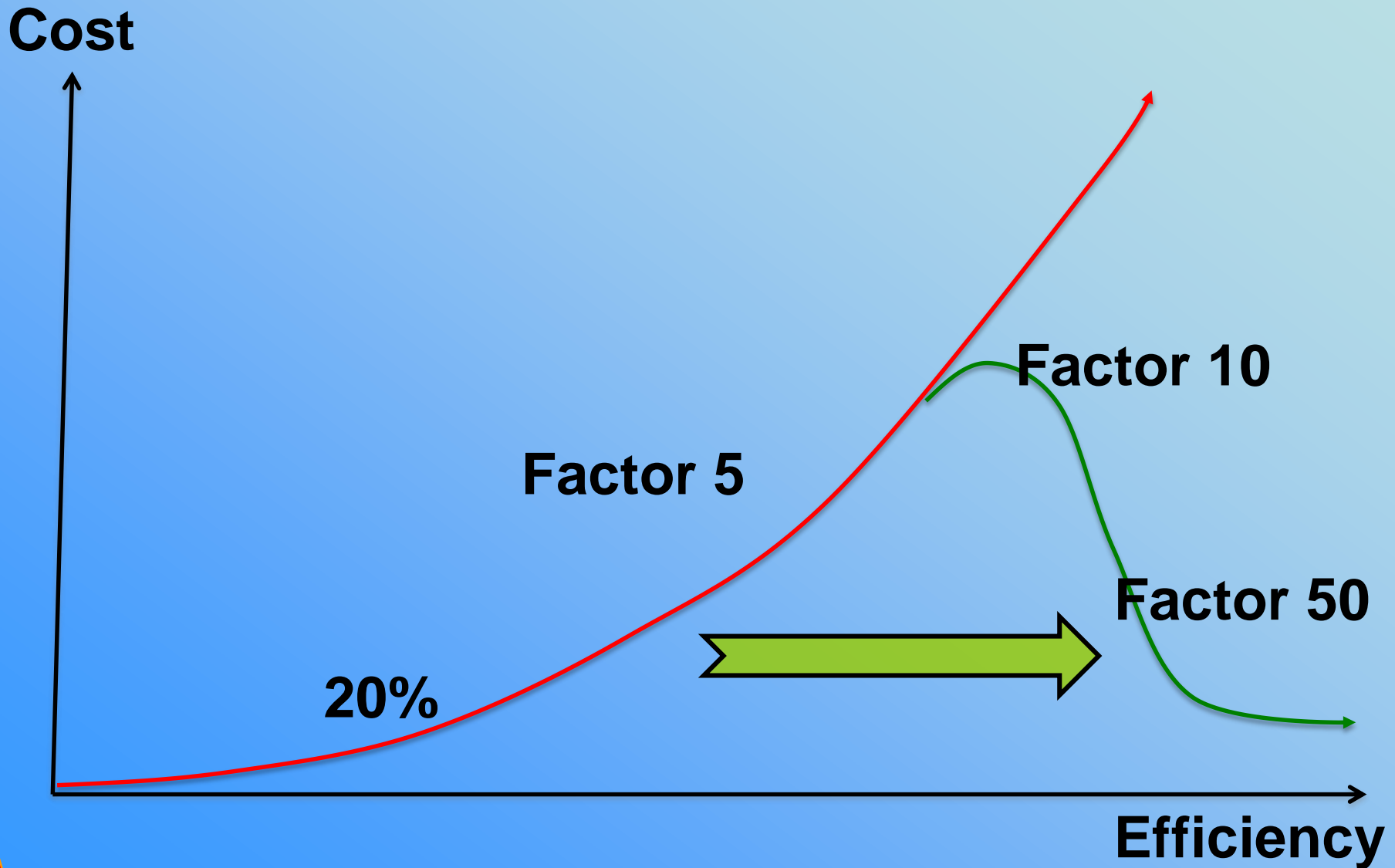
Development Alternatives

Level of Change

Cost

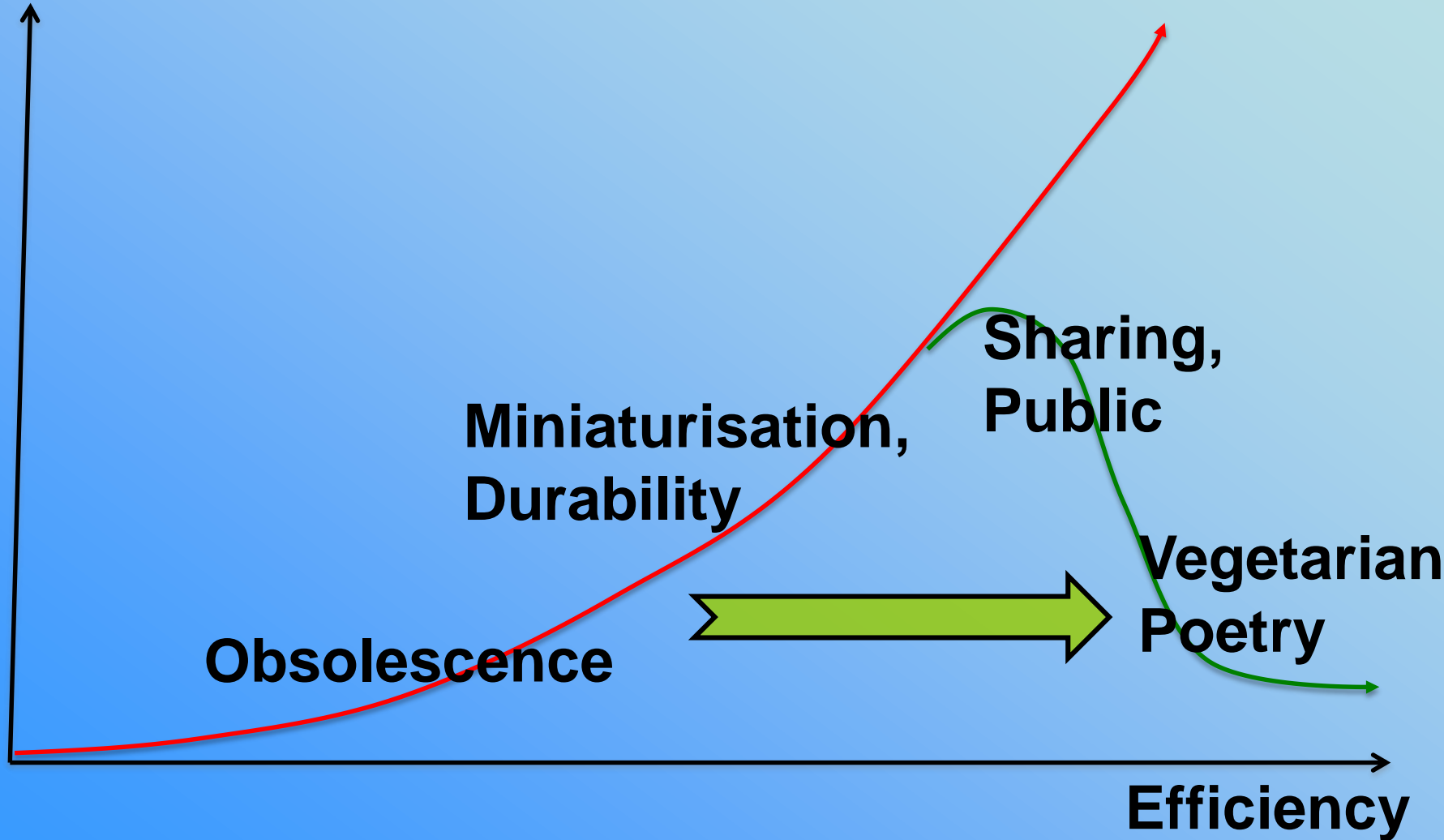


Change Achieved

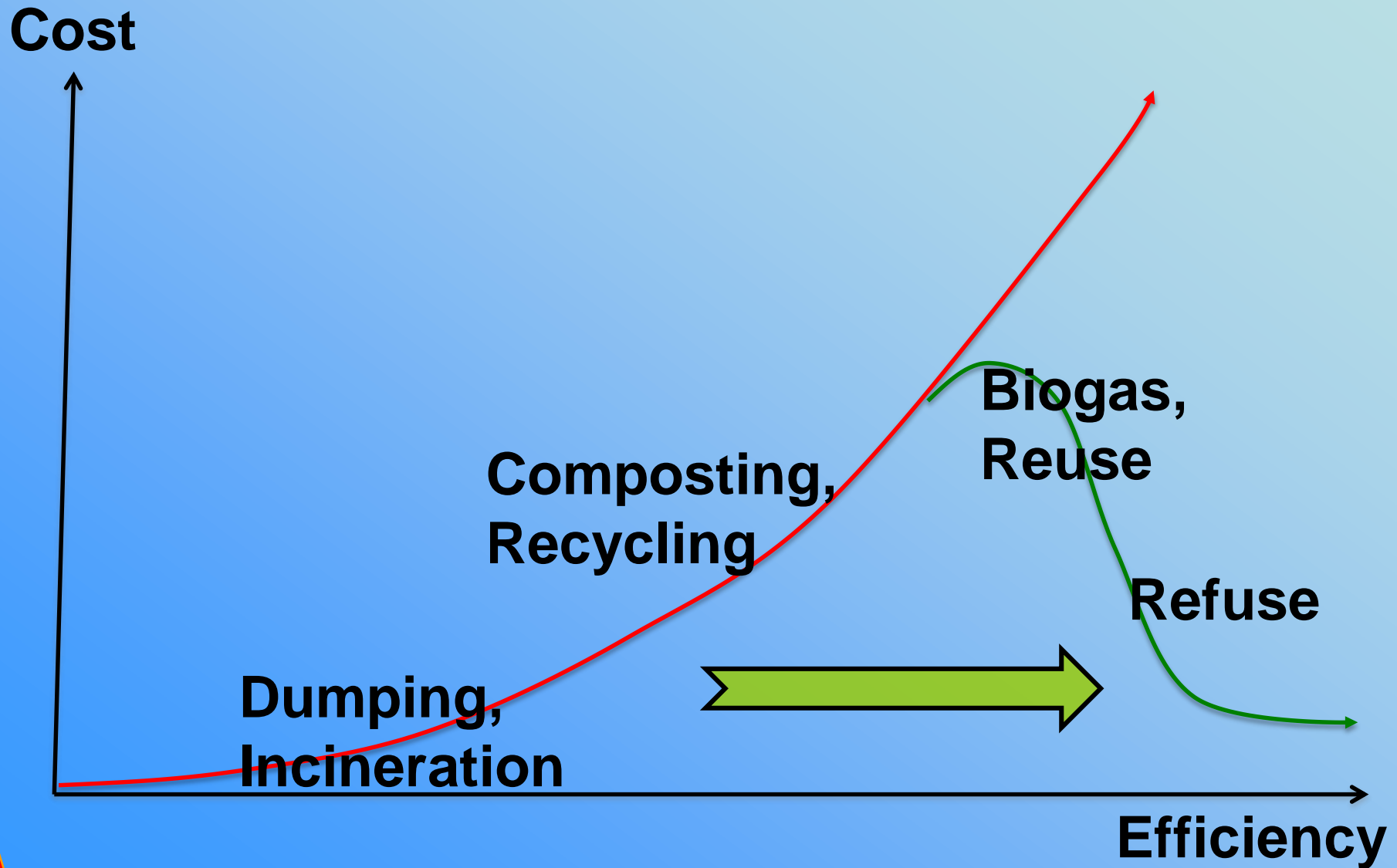


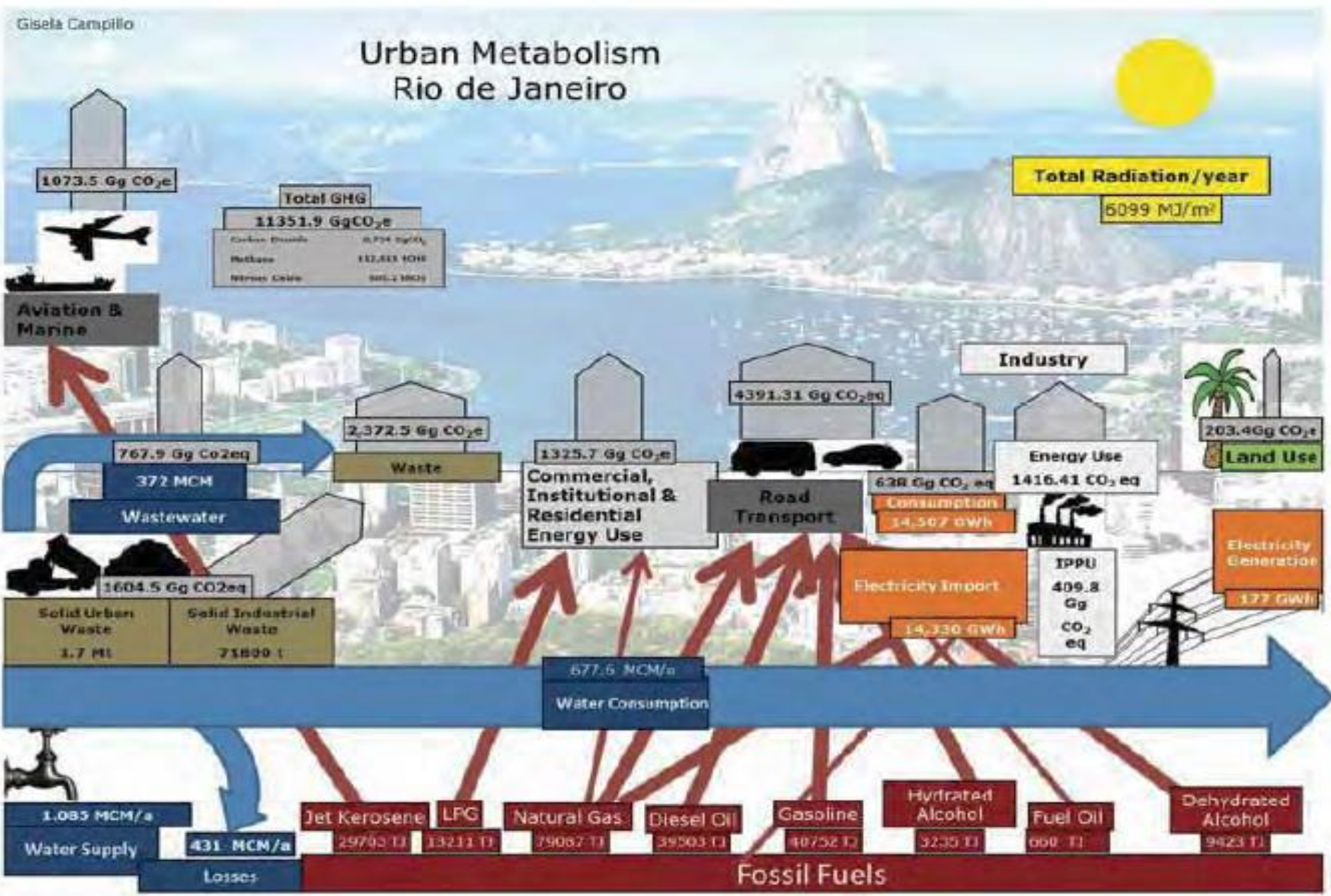
Methods

Cost

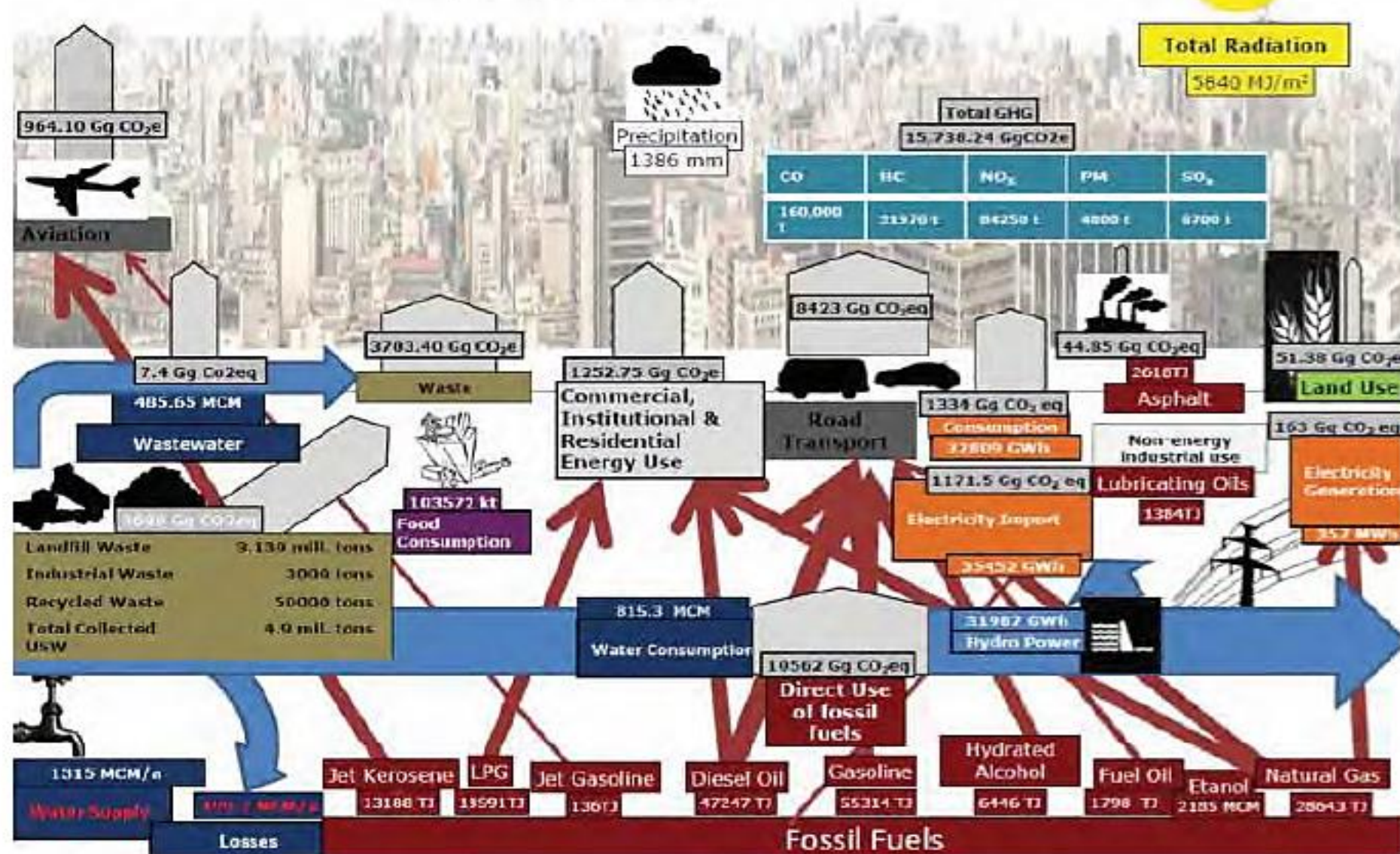


Example: Waste





Urban Metabolism City of Sao Paulo



DIACRAM

ILLUSTRATING CORRECT PRINCIPLE
OF A CITY'S GROWTH - OPEN COUNTRY
EVER NEAR AT HAND, AND RAPID
COMMUNICATION BETWEEN OFF-SHOOTS.

