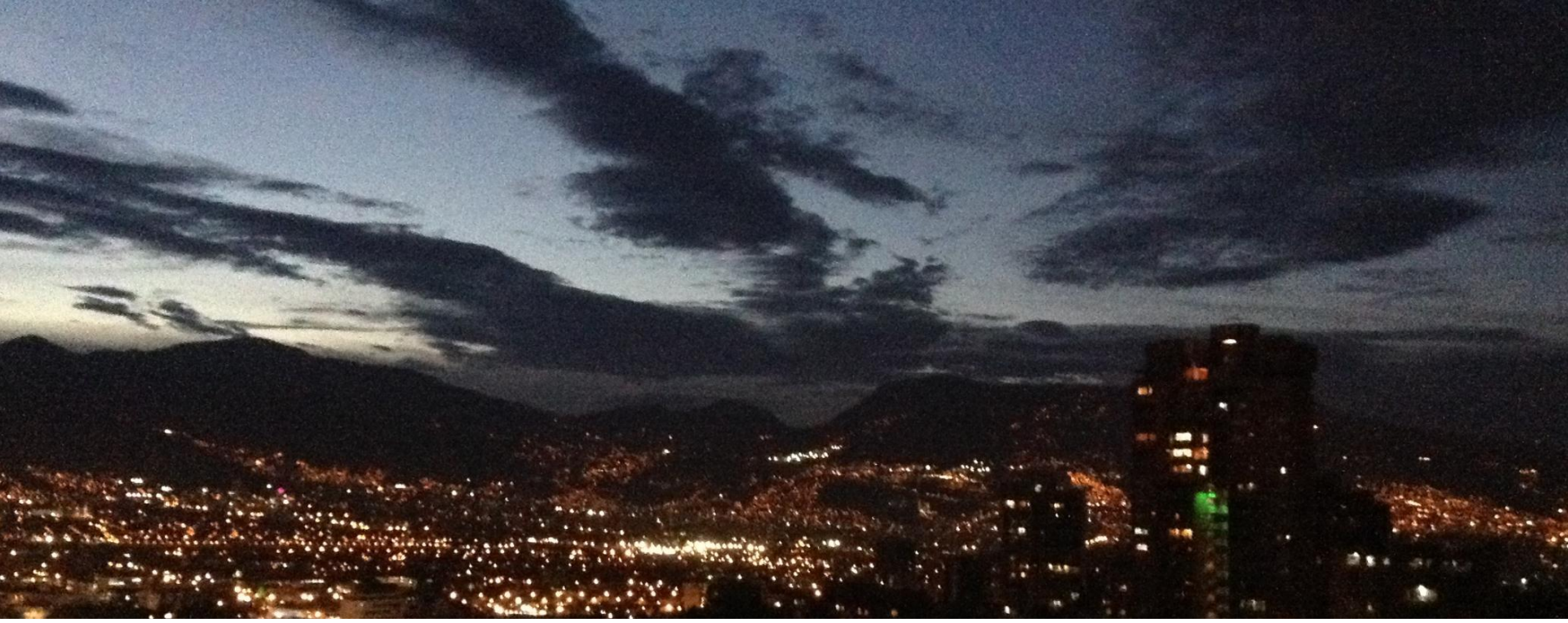


Designing cities; designing the future

Dimitri Zenghelis

LSE

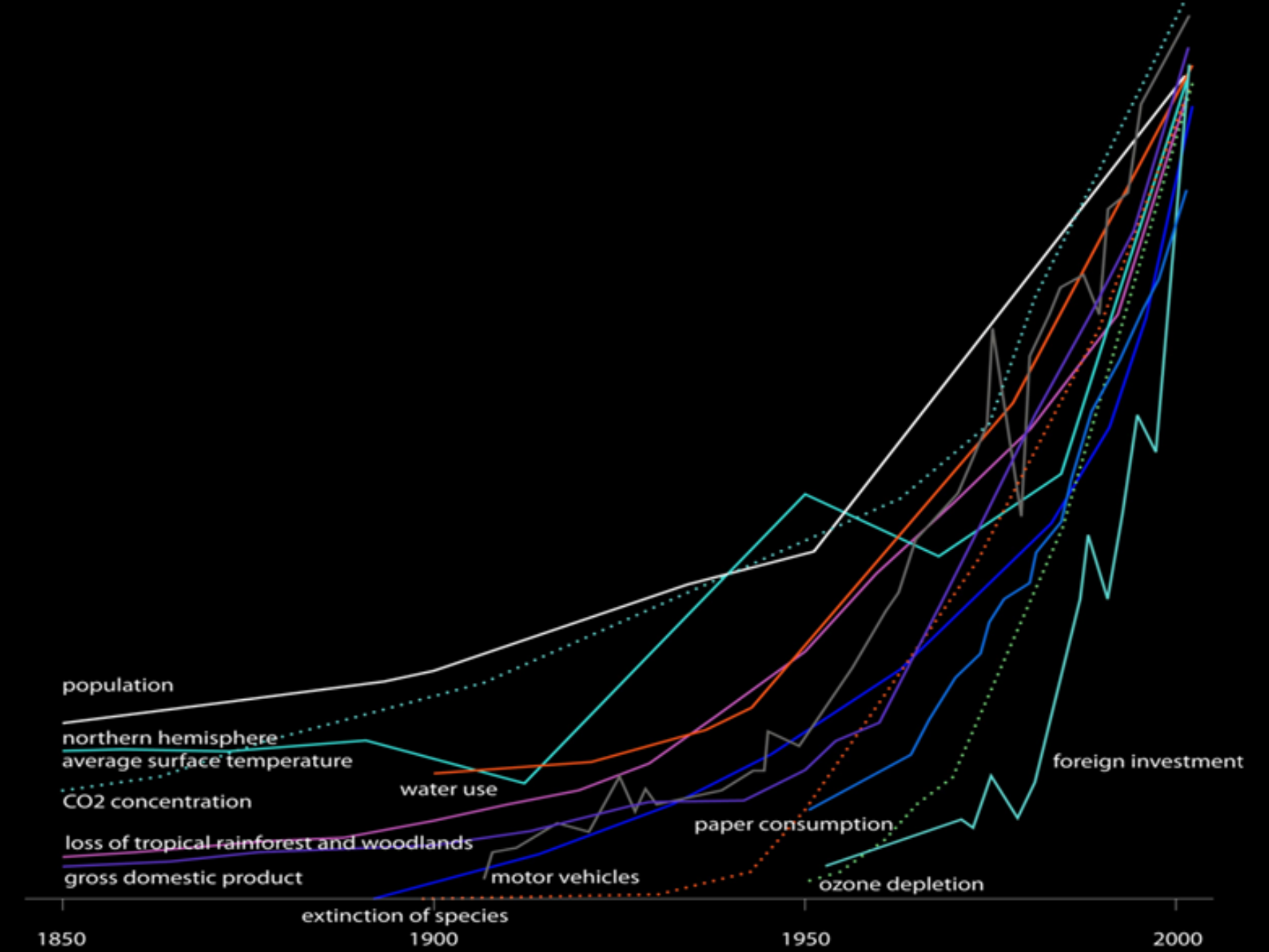
Grantham Research Institute on Climate Change and the Environment

LSECities

THE NEW CLIMATE ECONOMY

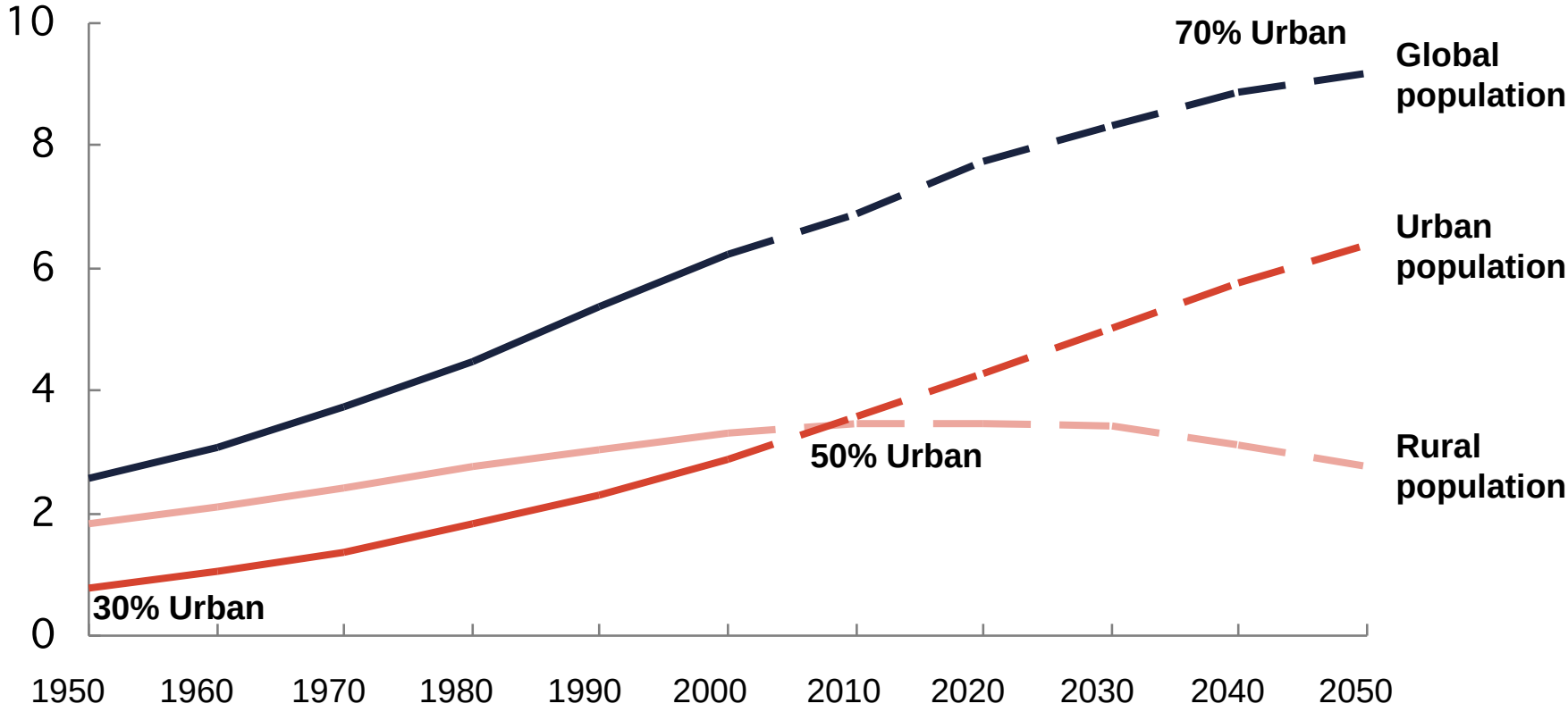
The Global Commission on the Economy and Climate

ICN Summit, Copenhagen, 21 May 2014


population
northern hemisphere
average surface temperature
CO2 concentration
loss of tropical rainforest and woodlands
gross domestic product
water use
motor vehicles
extinction of species
paper consumption
ozone depletion
foreign investment
1850
1900
1950
2000

Over 50% of the global population now live in cities and urban areas, rising to 70% by 2050

Billions



The 200 largest metropolitan economies account for 20% of global population yet generate 46% of global GDP.

SOURCE: LSE Cities based on United Nations World Urbanization Prospects, 2007 Revision

Modelling the macroeconomy

An economic model is essentially a simplified framework for describing the workings of the economy. It exerts the discipline of forcing the modeller to formally articulate assumptions and tease out relationships behind those assumptions:

- The very things that are most interesting when it comes to making predictions decades ahead are those which are hardest to model.
- Economic factors that are subject to economies of scale, complementarities, physical and institutional lock in, irreversibilities, new networks and path-dependencies lead to multiple equilibria.
- Fully integrated endogenous systems mean structural breaks push the economy onto new paths driven by new technologies, institutions and behaviours.
- Makes modelling long periods very hard because even small errors persist and explode and alter the outputs of the model like a malignant disease.
- The result is that more often than not, they are simply not modelled.
- Consequently the models tell us little about how the future will evolve or the costs and benefits of long run policies..

Planning the macroeconomy

Urban planning and the recent **financial market crash**:

- **Sprawling suburbs** such as Victorville, 100 miles northeast of downtown Los Angeles* entirely dependent on private cars to connect homes to work and services.

- Such neighbourhoods **unviable** when fuel prices rose from $2 early in the decade to $4 in 2008.

- The unsustainable nature of resource-intensive planning manifests itself in the short- as well as the long-term.

*See Karlenzig (2011) ‘The Death of Sprawl’

Designing an unsustainable future

1. An increase in the urban infrastructure gap	Indian urban infrastructure gap estimated at $827 billion over next 20 years, 67% for roads
2. Growing costs of traffic congestion	In Beijing these range between 7.5 and 15% of GDP
3. Rising cost of air pollution	For 311 cities, 86% exceed WHO air quality guidelines equating to 730,000 premature deaths
4. Increasing social exclusion	Rising levels of socially divided cities
5. Lock-in of inefficiently high levels of energy consumption	In study of 50 cities, almost 60% growth in expected energy consumption related to sprawl
6. Wide range of other economic and social costs	Road safety, health costs, reducing ecosystem services
7. Embedded carbon emissions	Production of infrastructure materials would generate around 470 Gt of CO_2 in developing countries
8. Operational carbon emissions	Doubling of carbon emissions from transport by 2050 (majority being urban transport)

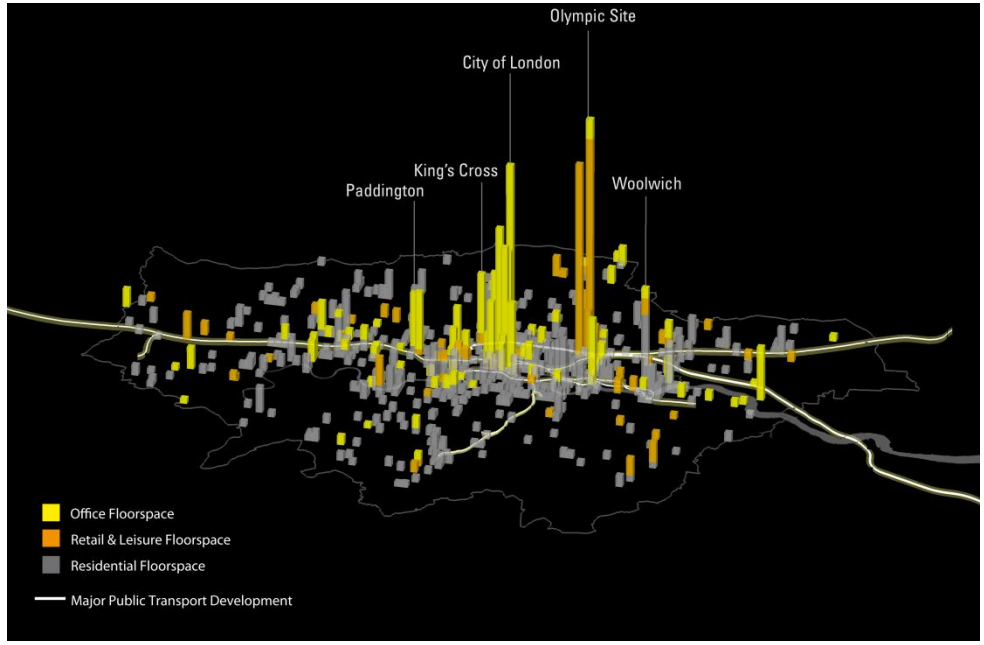
Sources: Creutzig and He (2009), SEI (2014) [preliminary analysis], Ahluwalia et al (2014), Bourdic et al (2012)

NCE Pillar 1 – Compact Urban Form: Maximising economies of scale, agglomeration effects and networking advantages

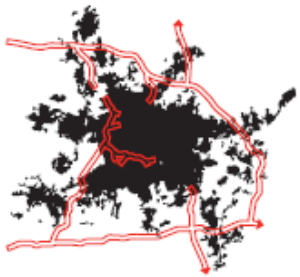
- Human-scale cities with higher density, mixed-use urban form and good quality urban design
- Compact city development goes beyond urban containment and includes dense, transit-oriented urban expansion for high-density, high-growth cities
- Development in established megacities can largely be accommodated on existing urban land

Re-densification is already happening in some leading cities

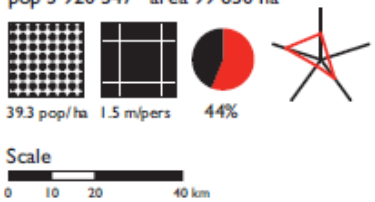
New development in London (LSE Cities 2012)
Floorspace additions between 2004 and 2011



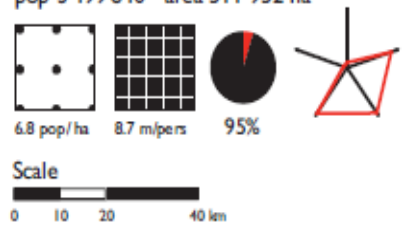
Lock in: Choices today create path dependencies for decades to come

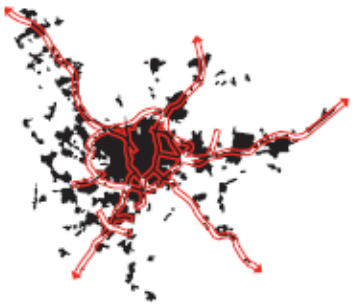


BERLIN
pop 3 920 547 area 99 650 ha

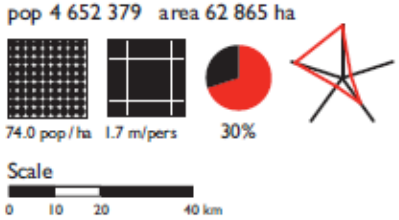


ATLANTA
pop 3 499 840 area 511 952 ha

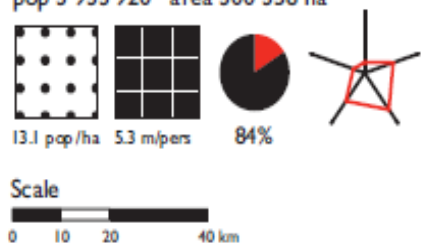




MADRID
pop 4 652 379 area 62 865 ha

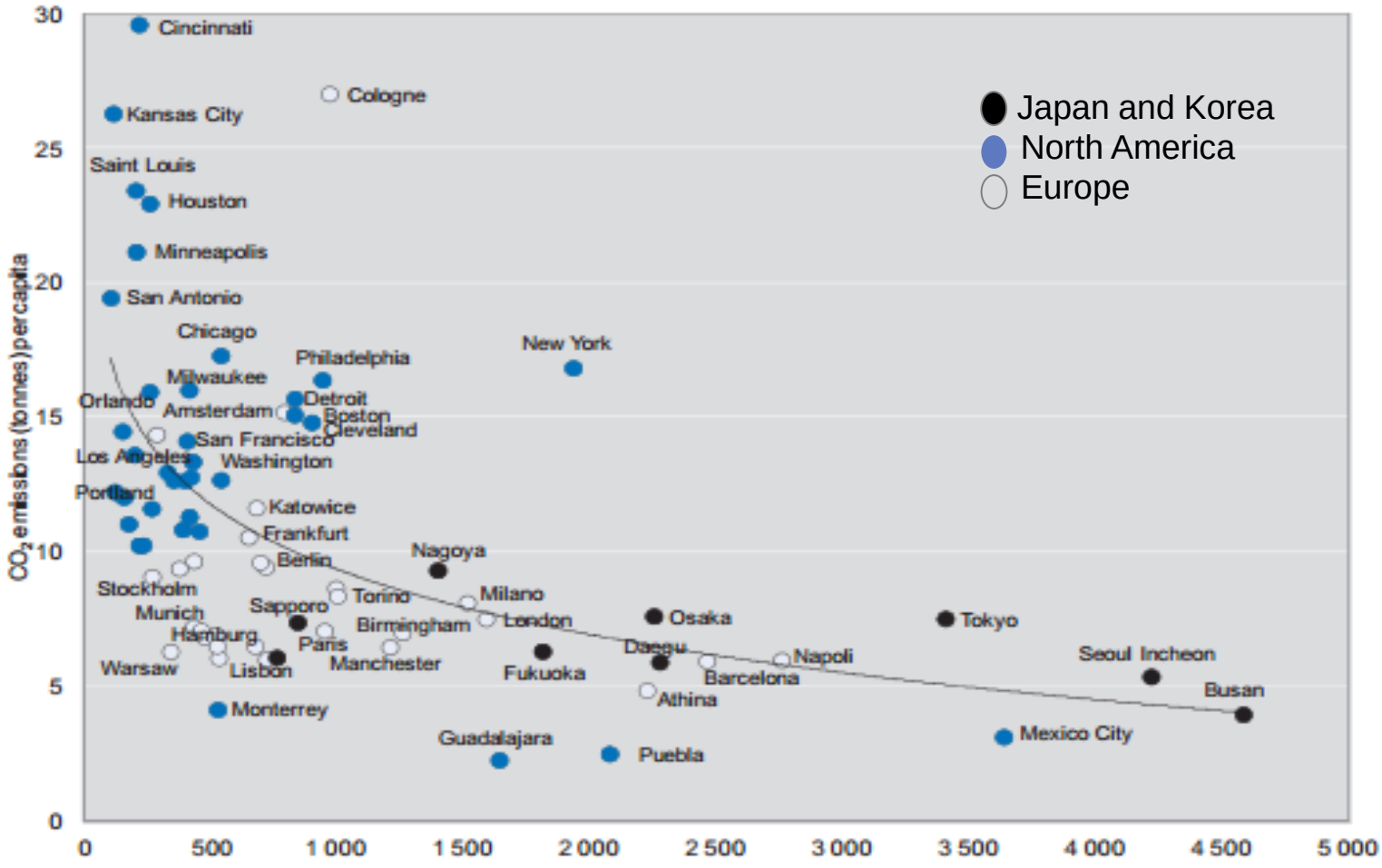


WASHINGTON D.C.
pop 3 933 920 area 300 358 ha



Cities with higher density tend to have lower carbon emissions

Population density and CO2 emissions per capita in 73 OECD metropolitan areas, 2006



Source: Call for evidence contribution by the OECD

NCE Pillar 2 – ‘Smart’ Infrastructure

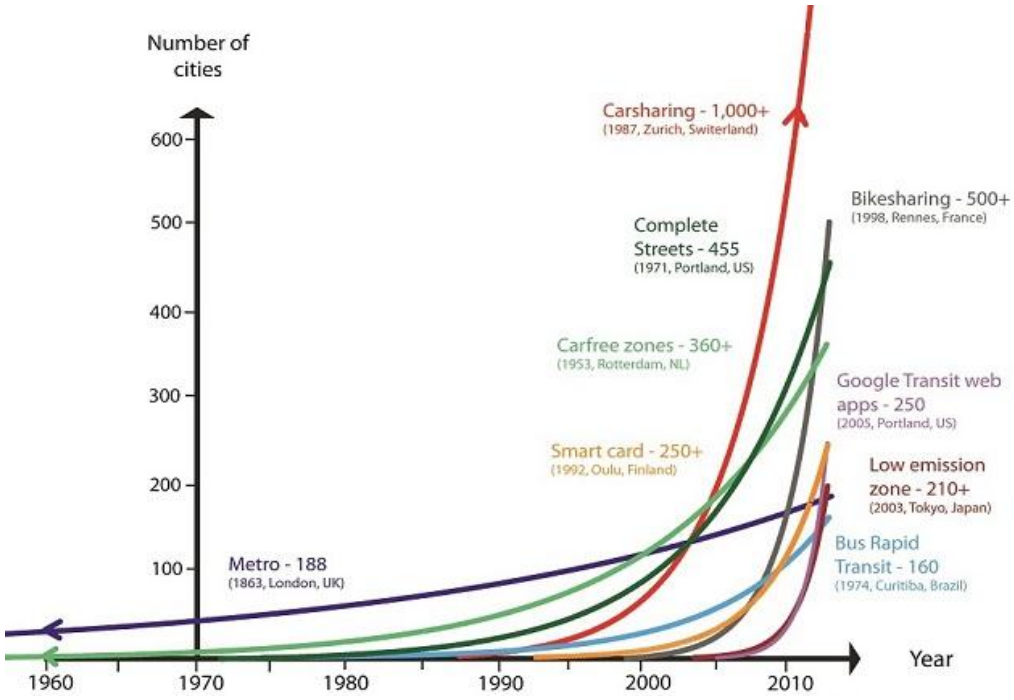
Resource efficient growth	About efficiency. Static and dynamic. Urban areas are well placed to lead the resource efficient transition. Cities contain **concentrated mix of specialisation and diversity** and economic activity which generates a **fertile environment for innovation** in ideas, technologies and processes. .
Efficient economies start with ‘smart’ cities	Integrated technologies will help make dense complex environments work efficiently. Cities are essentially tightly integrated systems, but with humans! Smart Grid Smarter Healthcare Smarter Public Safety Smarter Buildings – energy Management Cities that think, adapt and evolve will learn to optimize their resources, food, energy, health, communications and climate. A broadband digital infrastructure can connect people to people, people to city systems and city systems to city systems, allowing cities and residents to respond to changing circumstances in near real-time.

NCE Pillar 2 – ‘Smart’ Infrastructure

- Cities need smart infrastructure to capture the economic benefits of compact urban form.
- Crucial to invest in infrastructure resilience.
- Smart urban developments around the world are increasingly acting as critical test-beds

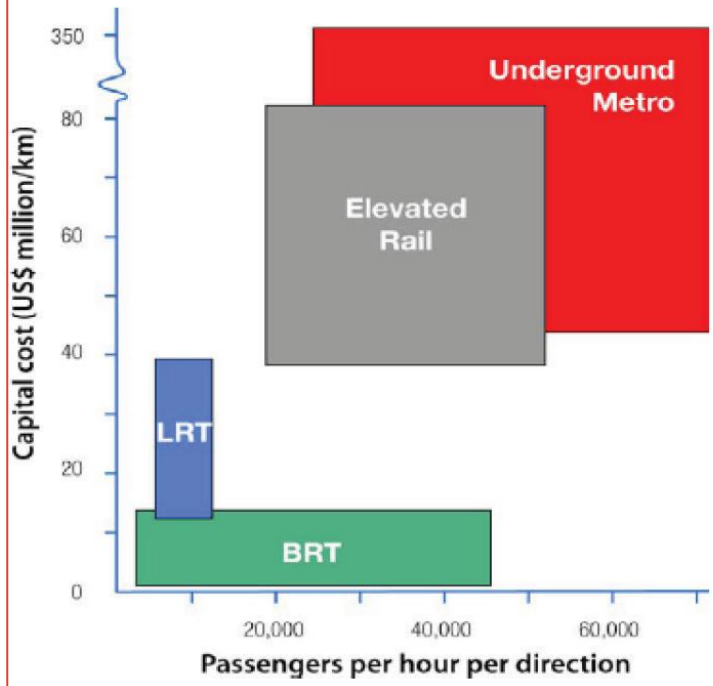
‘Smart’ infrastructure is already catching up

Number of cities (Source: Embarq 2012)



Comparing public transport systems

Number of cities (Source: Wright 2007)



Implementing smart transport infrastructures such as Bus Rapid Transit (BRT) has transformative effects.

NCE Pillar 3 – Effective institutions

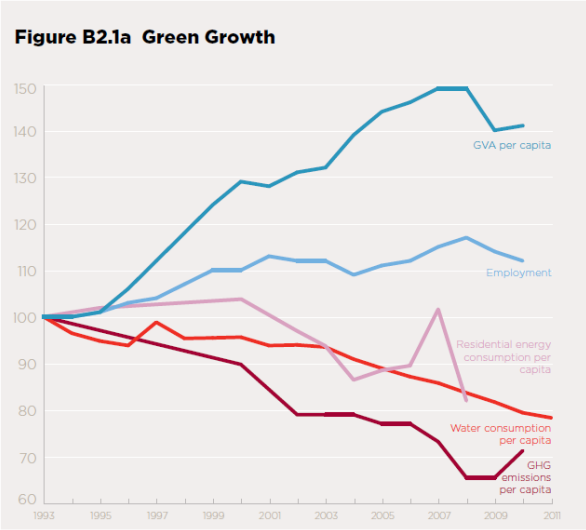
	Case study
Financial control	• **Greater fiscal autonomy** already a trend in higher income cities. • Expenditure at the sub-national level in OECD countries reached 33% in 2005 • Only 4% of the 500 largest cities in developing countries are creditworthy in international financial markets, and 20% in local markets. Yet for $1 invested in creditworthiness can leverage $100 from private sector • City-level creditworthiness takes time to achieve, e.g. Lima took five years.
Transparency and accountability	• Bangalore is using GIS technology and **on-line self assessments** to streamline property tax. Revenues doubled in one year between 2007-08 and 2008-09.
Metropolitan Authorities	• Transport for London: **a single London wide agency** overseeing all urban transport modes- non-motorised transport, public transport, and road traffic.
Policy coordination	• India's National Urban Transport Policy, integrating transport and land use planning as a single strategic goal.
Accounting standards	• Need for system of **'integrated accounts' for cities** - develop framework similar to Standard National Accounting System – US GAAP

Alternative pathways can reduce costs and deliver co-benefits

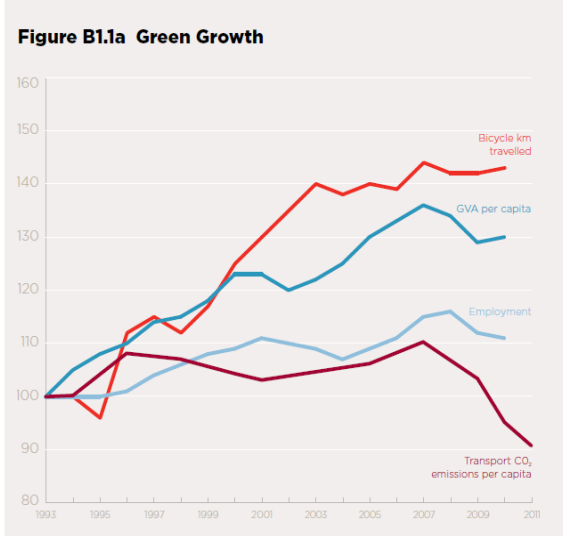
1. Closing infrastructure gap	• Compact form and could save China $1.4 trillion in infrastructure spending (World Bank)
2. Greater productivity and growth - from agglomeration	• Compact urban pathway in China could lead to higher economic growth, greater productivity, boost to tertiary industry share (World Bank)
3. Cost savings – in transport sector	• Transit-oriented urban development can reduce US per capita car use by 50%, reducing household expenditure by 20%
4, Co-benefits public-transport-oriented and walkable cities	• Co-benefits include: equitable accessibility, reduced congestion, improved public health and safety, energy security
5. Substantial health benefits from improved air quality, greater physical activity	• More active lifestyle (walking + cycling) estimated at £17 billion per annum to NHS in UK
6. Emissions reductions from decreased demand for construction materials	• Evidence to come from SEI
7. Lower carbon emissions transport, buildings etc.	• IPCC estimate 20-50 percent reduction in GHG emissions from urban transport (2010-2050) • Compact urban form reduce emissions by about [1.1GT] in 2040 rising to [2 GT] in 2050

Some cities have shown that an alternative urban pathway can go hand-in-hand with economic growth

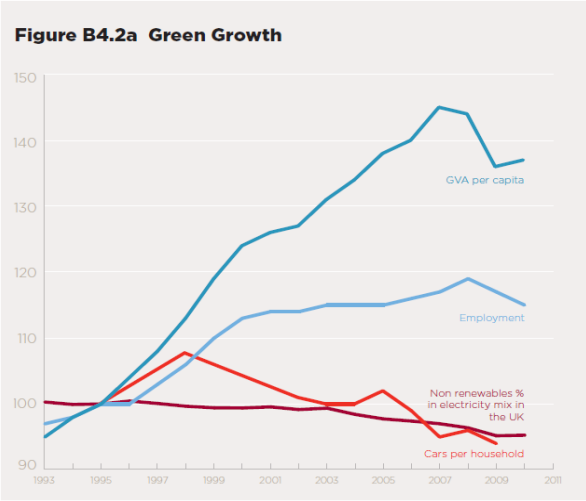
Stockholm



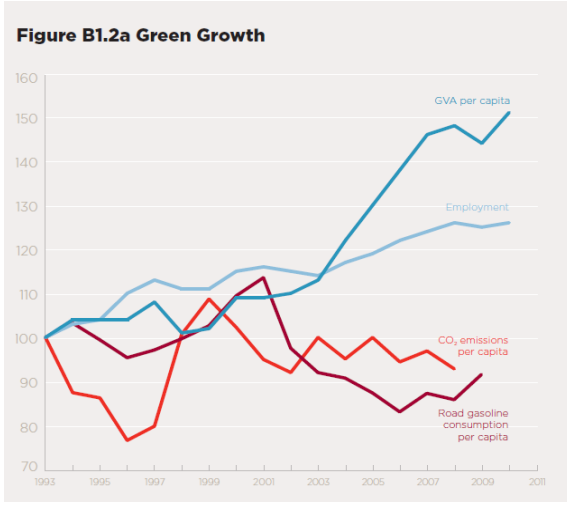
Copenhagen



London



Hong Kong



Low carbon growth in cities

Stockholm

GVA per capita grew by 41% from 1993 to 2010

GHG emissions per capita fell 31% from 5.4 tCO2e to 3.7 tCO2e

Copenhagen

GVA per capita grew by 30% from 1993 to 2010

Transport-related emissions fell by 9% to 0.76 tCO2 per capita

Hong Kong

GVA per capita, grew by 51% from 1993 to 2010.

Emissions per capita fell by 7% to 5.5 tCO2

Road fuel consumption per capita fell 8% to 50 litres per year

Conclusion

We are at a crossroads: **inaction will reduce citizen welfare, increase costs and insecurity and eventually risk urban catastrophe**.

- **Resource-efficient growth is the only sustainable long-term option**.
- A transition to a low-carbon resource efficient economy can bring a **new era of progress, induced innovation and prosperity**. Cleaner, quieter, more efficient, energy secure sustainably-planned cities also attractive.
- **Credible long-term policy can reduce uncertainty** in recession and generate profitable new markets, drive private investment/jobs/growth.
- **Long-run** coordinated **thinking is required** – focus on designing and directing rather than predicting future. Race in a market to **supply a resource-constrained** world.
- Major world **cities are increasingly taking the lead** setting strong targets.

The **choices made in cities today** on transport, infrastructure, buildings and industry, as they grow rapidly over the coming decades, **will determine:**

- **the technology, institutions and behaviours they lock-in to**
- whether mankind can both manage climate change and capture the benefits of resource-efficient growth.