IAAS
Institute For Advanced Sustainability Studies e.V., Potsdam

Guest lecture

“CITIES AS SUSTAINABLE SYSTEMS”

Wednesday 27 April 2016

By Dr Pierre LACONTE
President, Foundation for the Urban Enviroment, Co-designer of the Louvain new university town (Belgium), Member of Akademie der Kuenste, Berlin (Sektion Baukunst)

SUMMARY

1. GLOBALISATION OF TRADE AND FLOWS

1.1. TRADE FLOWS INCREASE

1956 : the first container ship; 2013: $20 trillion trade (source “The Economist” 18/05/2013). A majority of mega cities in the world are located on coasts: Tokyo, Mumbai, Sáo Paulo, New York City, Shanghai, Lagos, Los Angeles, Calcutta, Buenos Aires, etc. (source UN – 2011).

Shift of power from nation-states to global firms and attempts to organise world trade flows to their benefit (TPP, TIPP etc.).

1.2. FINANCIAL FLOWS INCREASE (easy money/easy take overs)

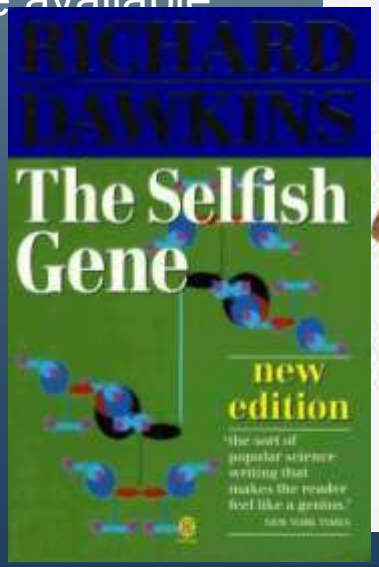
Financial flows have been boosted by “quantitative easing” policies (USA, UK and BCE). This monetary injection, estimated at more than $10 trillion will have irreversible effects on cities, as long-term urban development projects are adopted or rejected in response to short term concerns, as illustrated by the MIPIM World Projects Fair (e.g. Belgrade waterfront)
http://www.ffue.org/?s=mipim+2013

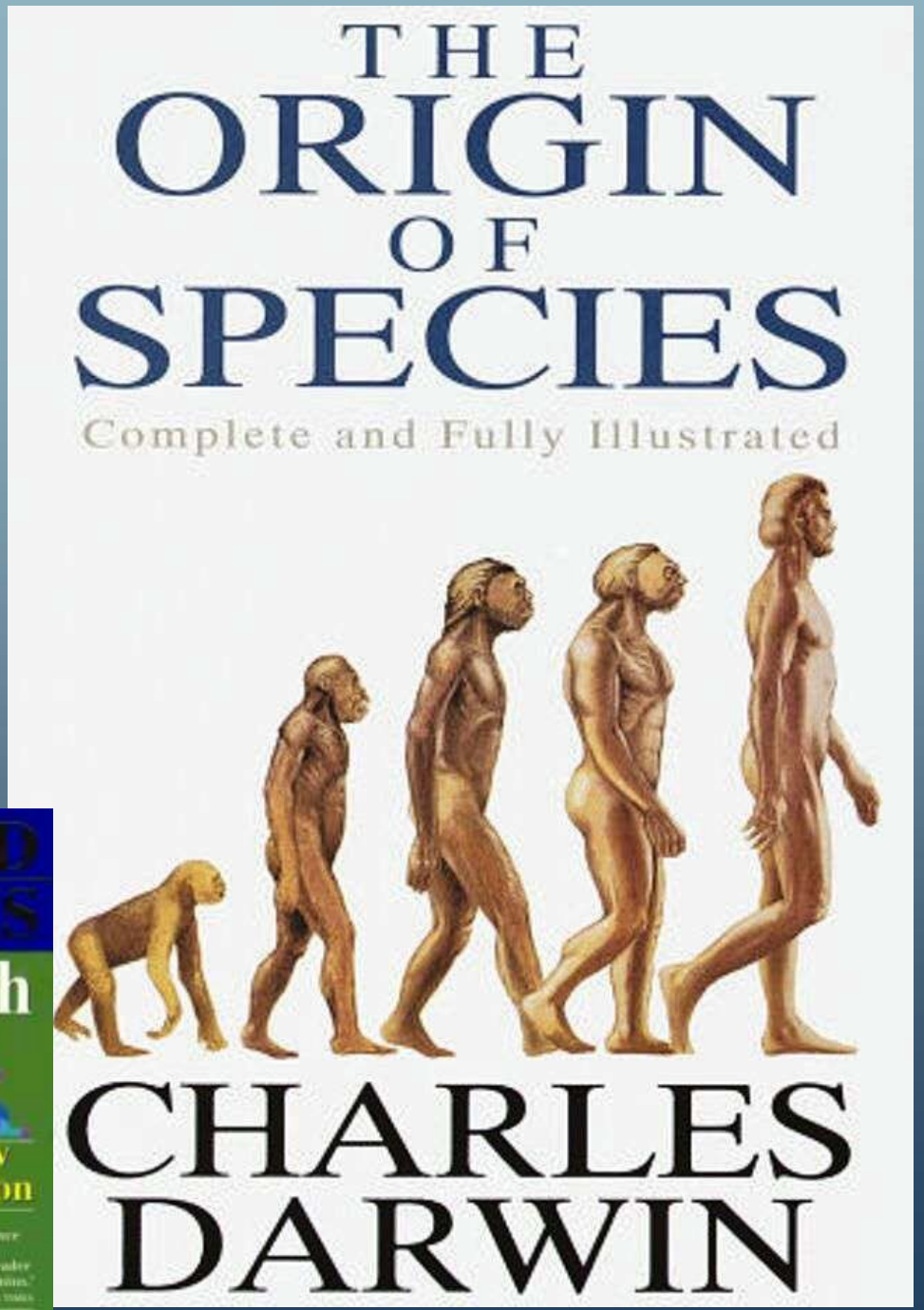
1.3. DECREASE OF GLOBAL SOLIDARITY (e.g.war refugees and future climate change migrants)

Intergenerational solidarity issues on facing the future cost of climate change.

Homo sapiens conquered the planet through intelligence and greed, without limit, far beyond the available resources (Darwin).

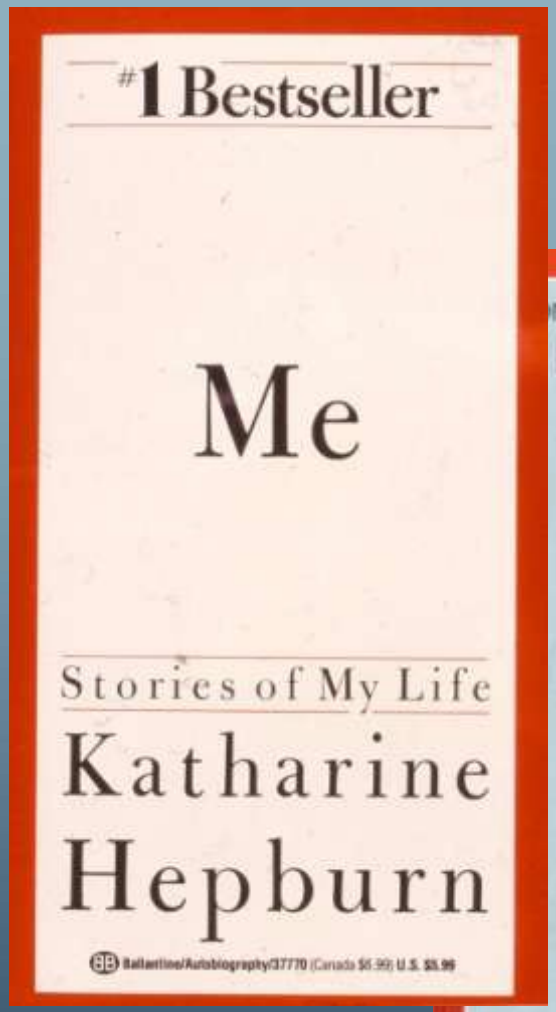
The short-term interest of individuals takes precedence over the collective longer-term interest (Dawkins, de Duve).





The post-war “me culture” expanded into the “me-me-me culture” (me, my-self and I) of the post-baby boom generation.

“Mass individualism” (F. Gauchet) weakens intergenerational solidarity in financing adaptation to future challenges, mainly climate change.



2. DISPERSED ADAPTATION TO CLIMATE CHANGE IN THE GLOBAL SYSTEM

Adaptive investments raise economic issues related to the chosen discount rate for infrastructure investments

The Stern Report's assumptions (fixing artificially low discount rates of 2-3%) are opposed
by economists who favour the use of standard public or private market discount rates. "Building your way out of Armageddon by investing now" vs "letting future generations pay later for the effects of climate change, using their own resources".
IN ANY CASE: Preparing human resources for emergency rescues (civil and military).

The case of the Low Countries climate change adaptation. The Dutch approach – Rotterdam's Maeslantkering protective barrier

The Netherlands has been pioneering long term infrastructure investments to protect its coastal cities from the sea. In the 1980s, it was decided to reinforce dikes in the Delta generally. The epitome was the giant "Maeslantkering" barrier on the main canal serving the Port of Rotterdam. Built in 1997 at a cost of circa €400 million, it has been used only once, in 2007. Questions are being raised in the Netherlands about the economic justification of giant infrastructure works. A contrario, the Thames flood barriers.

The Maeslantkering barrier when open

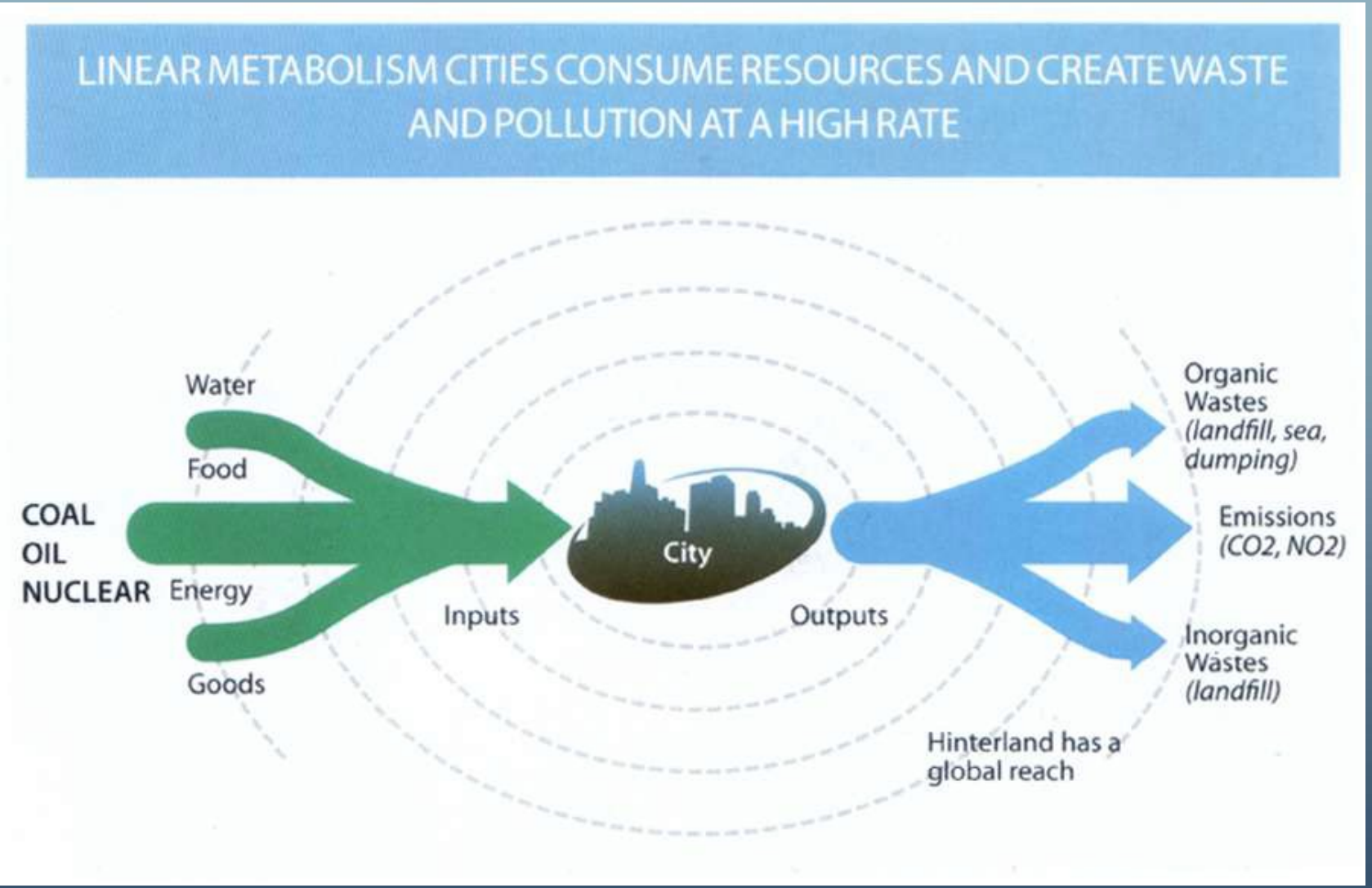
The Belgian approach – buffer islands

Belgium has taken the opposite approach, shunning large coastal investments and relying on (subsidised) private sector initiatives. The “Vlaamse Baaien” project combines buffer islands against high tides and North Sea storm surges with the construction of large- scale wind parks providing renewable energy aimed at - among others - the future German market.

3. URBAN ADAPTATION ISSUES

URBAN METABOLISM AND THE CIRCULAR ECONOMY

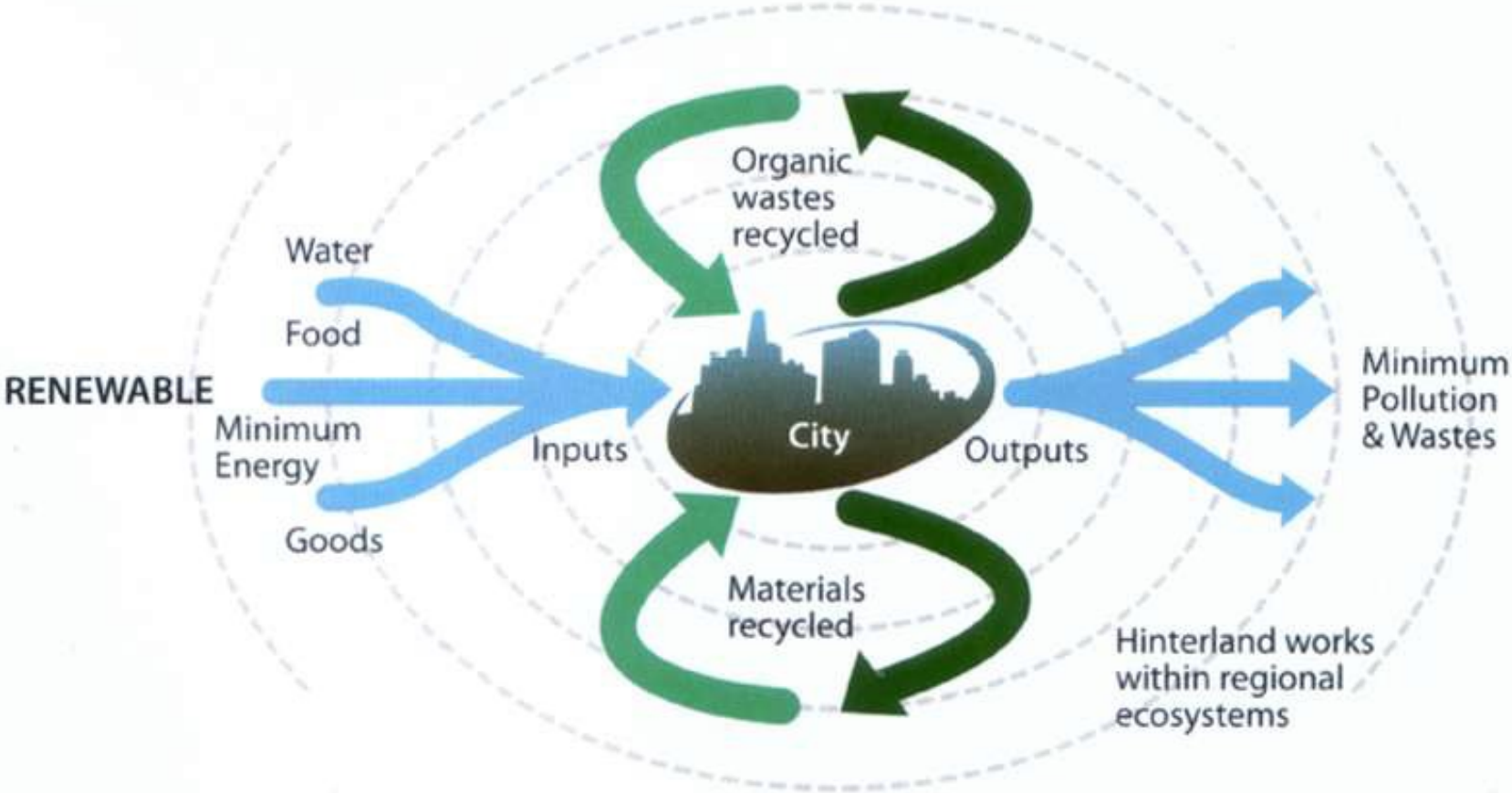
The metabolism of cities: from linear to circular



Source: F. Girardet, World Future Council

- **The linear approach is unsustainable in an urbanising and finite world**

CIRCULAR METABOLISM CITIES REDUCE CONSUMPTION AND POLLUTION, RECYCLE AND MAXIMIZE RENEWABLES



(Source: F. Girardet, World Future Council)

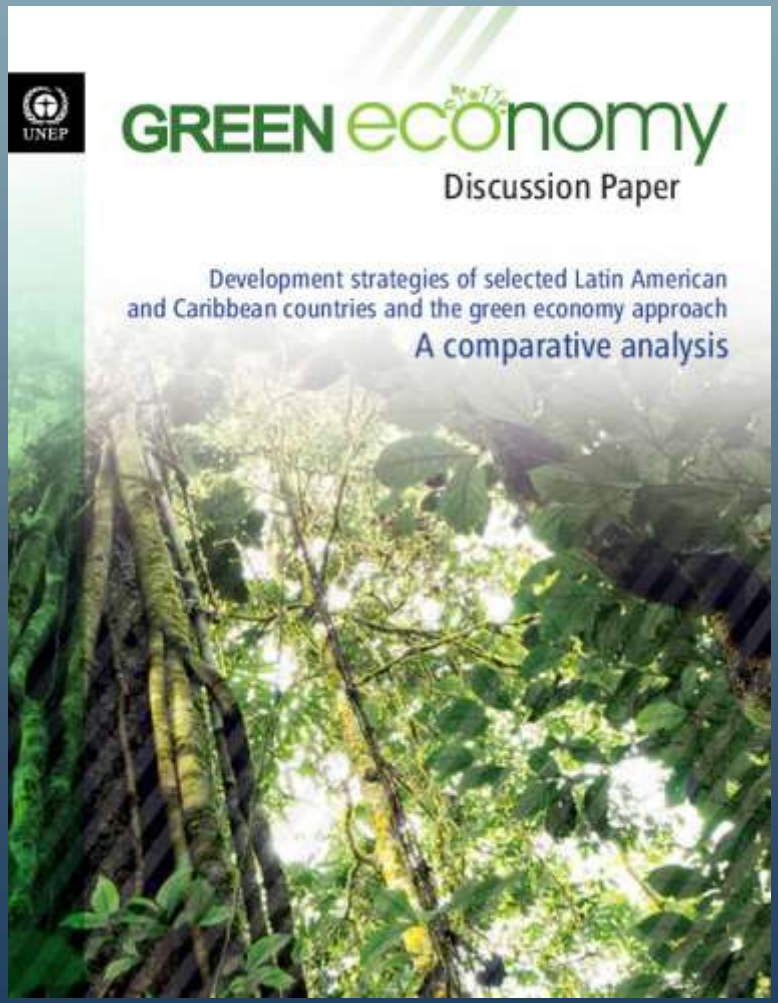
One rightly speaks about an urban mine. However the quantification of inputs and outputs for a given city and the limits of recycling are most complex (from « secondary and critical materials » down to « end of life » materials). Close recycling loops include loops with one range of materials, each having their own down-cycling potential: steel, aluminium, wood fibres in paper concrete, glass etc.

> **See Vera Susanne Rotter (Technische Universität Berlin), "Circular Economy for critical raw materials", SESSION 2: SECONDARY AND CRITICAL RAW MATERIALS, Industrial Ecology: Science, the Environment and the Circular Economy, Monday, April 25th, 2016, Vrije Universiteit Brussels, Belgium**

Moreover the quantification of flows must relate to the one of stocks, whose stability is necessary for the flows.

The circular economy as a resource saving tool

The case of metal recycling: opportunities, limits, Infrastructure



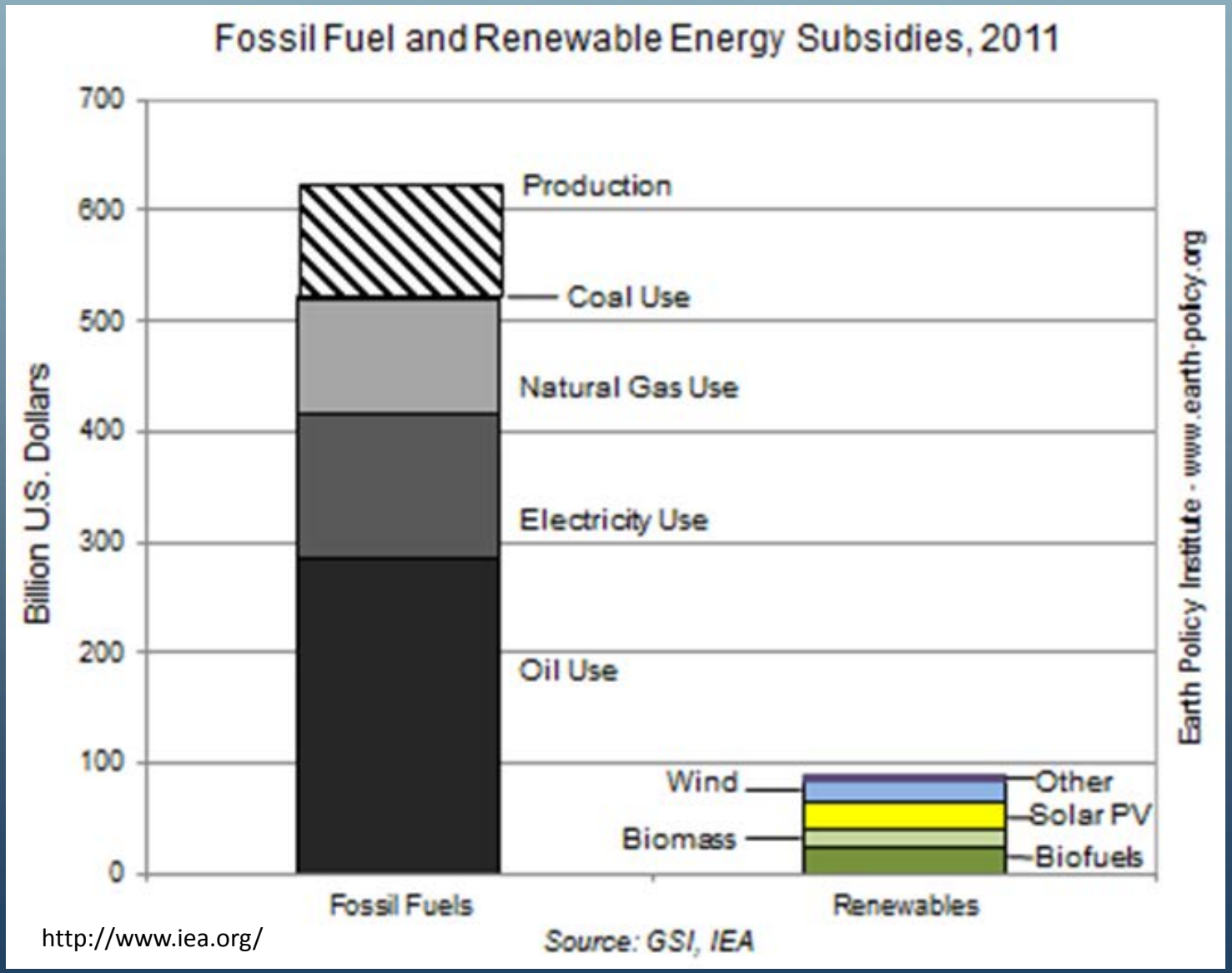
Unresolved issue: the absence of agreed measurement standards for greenhouse gas (GHG) emissions.

A survey of GHG-emissions accounting methods has been done, in a (too) little-known comparative study by Baader N. and Bleidschwitz R., at the College of Europe in 2009. Unlike the measurement of GNP, for which there is a generally agreed method, there is no such agreement about the GHGs.

-The measurement covers either all of the six different Kyoto GHGs, or only some of them, mainly carbon dioxide and methane.
-Different potential global warming estimates are obtained according to whether the second, third or fourth IPCC report is used.
-The reporting standards are different.
-The scope of measurement either only includes direct emissions or also includes indirect and life cycle emissions.
-The sectoral definitions are highly variable e.g. those for transport (aviation and shipping excluded).

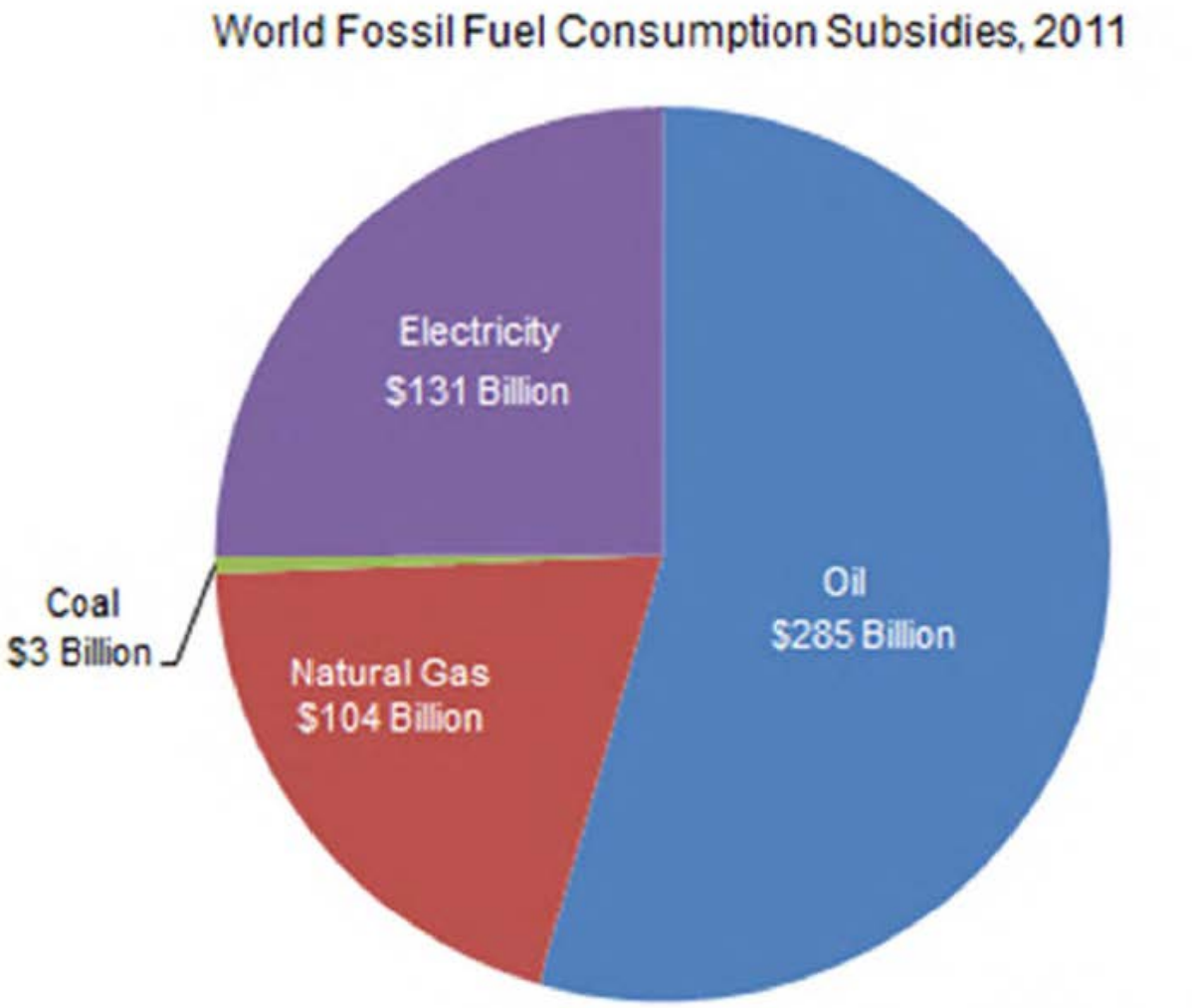
Urban sustainability is therefore better monitored and achieved by examining policies effects on energy consumption and other resources.

At the world level - Measuring energy production and consumption is a realistic substitute for direct measurement of GHGs, as these are by far the main sources of emissions.

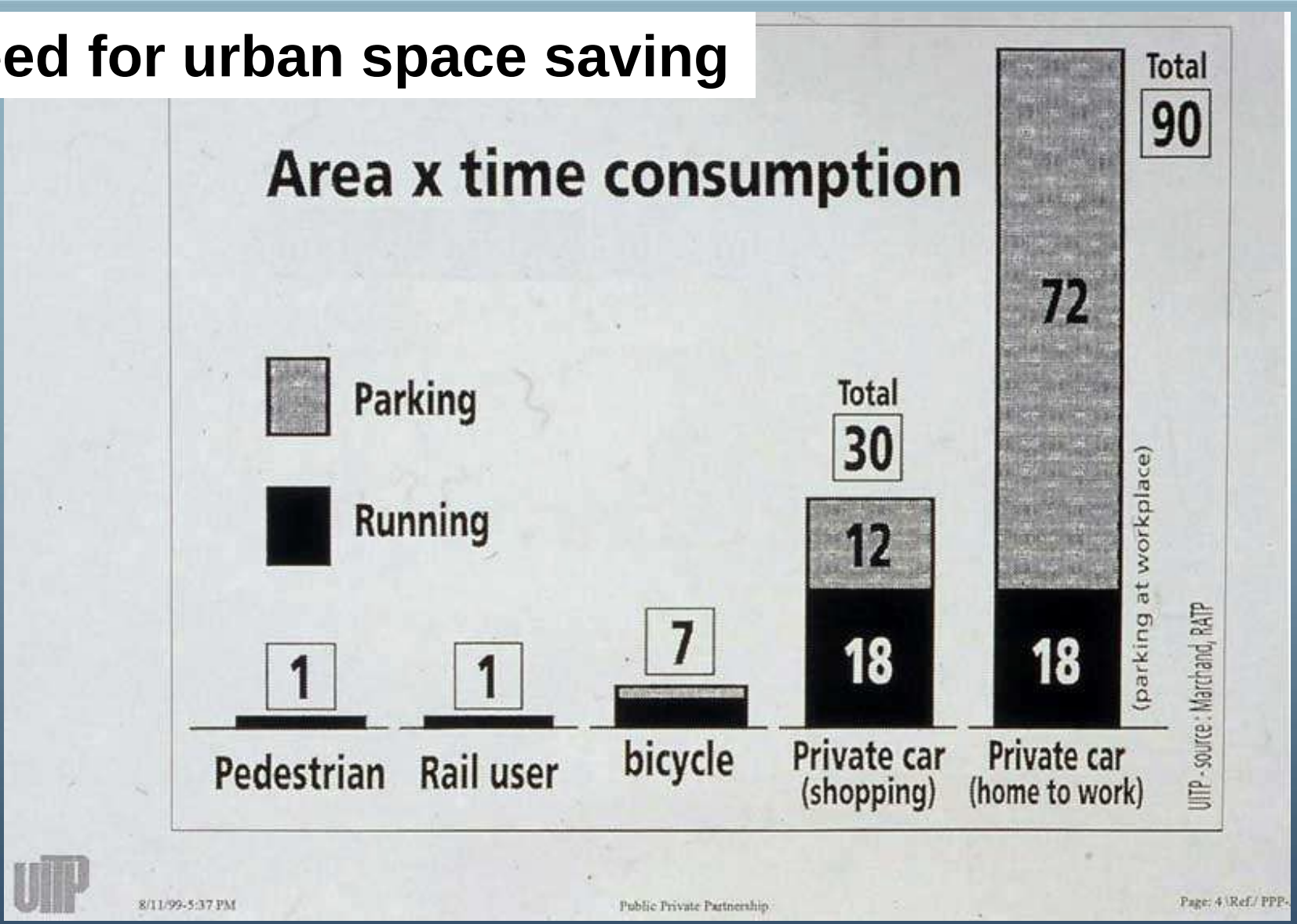


FOSSIL FUEL SUBSIDIES

(8) Earth Policy Institute - http://www.earth-policy.org/



The need for urban space saving

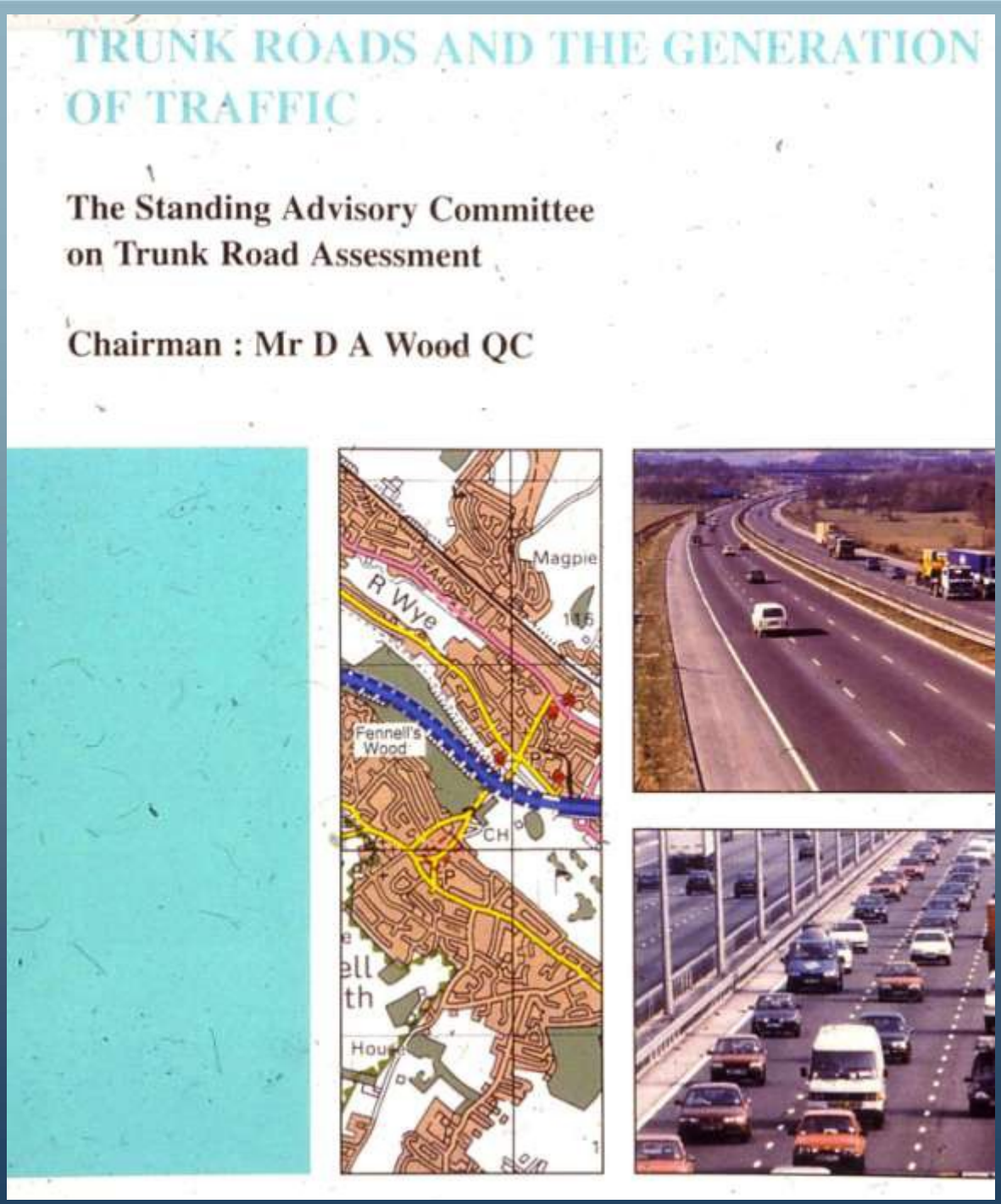


If one takes the land consumption of a pedestrian as the benchmark, the car takes up about 18 times more space as it moves, but it requires parking for the time it does not move, i.e. for some 90% of its life cycle. Land consumption therefore has an area x time dimension (Source: Louis Marchand, RATP, for UITP).

Need for infrastructure saving in cities

The SACTRA report (1994)

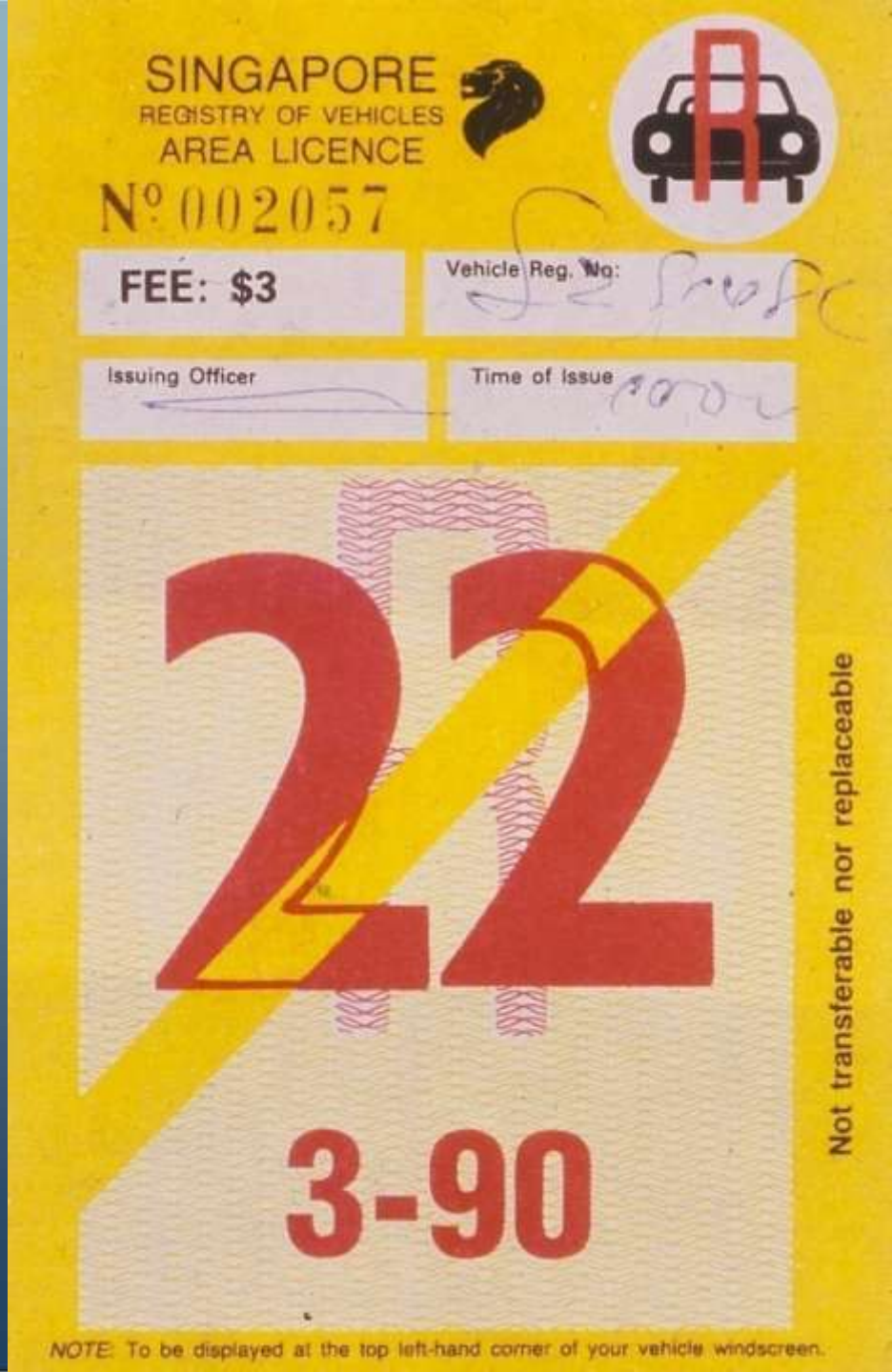
The SACTRA report showed that new road space attracts more new traffic than its additional capacity.



4. GOVERNANCE OF URBAN SUB-SYSTEMS FOR RESOURCE AND ENERGY SAVING

CASE STUDIES OF GOVERNANCE APPROACHES IN FAVOR OF URBAN SUSTAINABILITY

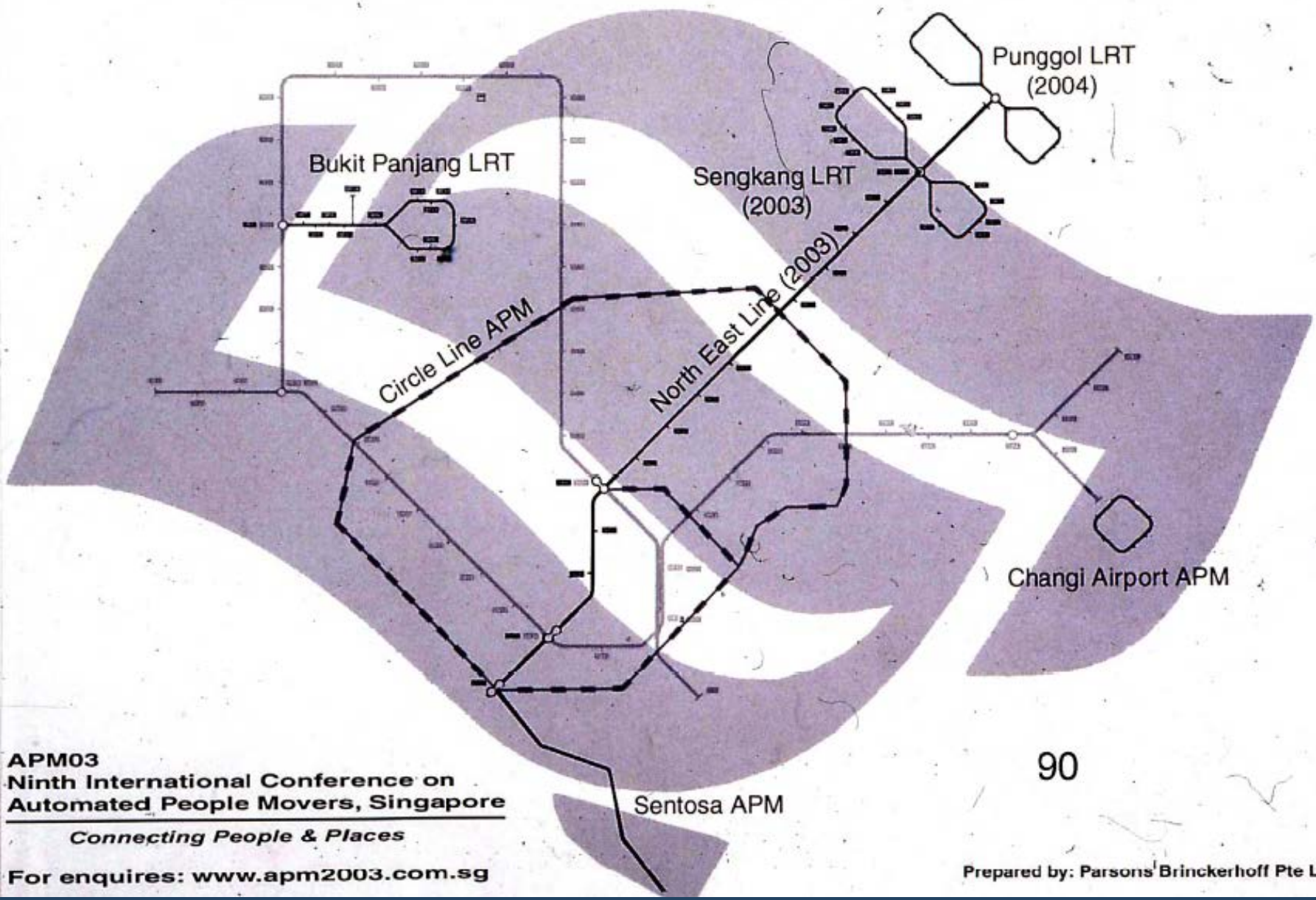
- **4.1. SINGAPORE (entire State)**
- From 1975 Singapore has endeavoured to save scarce land and natural resources through market mechanisms such as auctioning of new car plates (replicated in Shanghai), and pricing of road access to the city for solo drivers (no fee if there are 3 passengers). This was easily accepted as it gave drivers the choice of paying for solo driving or accepting 3 passengers.



In 1998 the system was replaced by electronic road pricing, achieved through pre-paid cards debited when used (so no invoice-related privacy problem).

- Level of charges can change at any moment, according to the level of congestion (easily accepted as it is not an additional tax).
- In 2018, according to a Feb. 2016 decision based on long trials among four candidate consortia, the ERP will be operated from satellite at any point of road congestion (gantries no longer needed).

Singapore Automated Transit System at a Glance



APM03
Ninth International Conference on Automated People Movers, Singapore

Connecting People & Places

For enquires: www.apm2003.com.sg

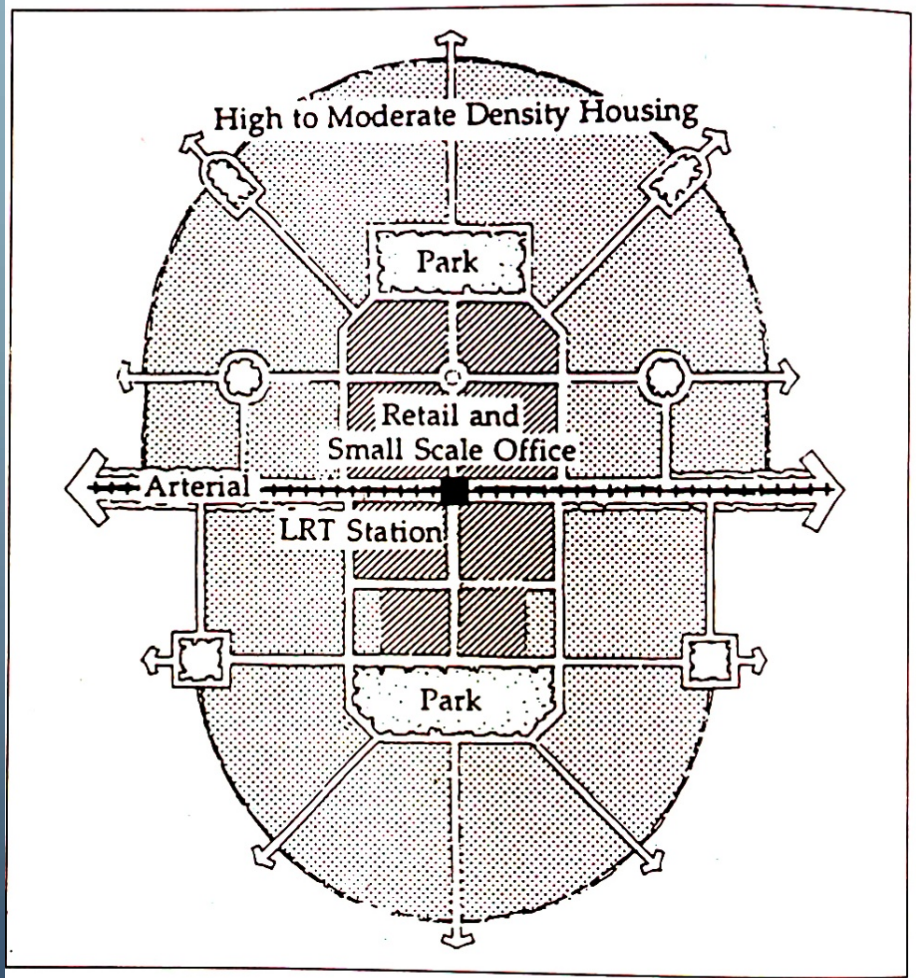
Prepared by: Parsons Brinckerhoff Pte Ltd

4.2. Portland: long term control of urbanised areas in an entire metropolis

In 1975, the State of Oregon, at the request of a group of farmers, passed a legislation instituting a development cordon around the city of Portland.

3. Fuel taxes (which are the main source of transport funding) can only be used to fund road investment. More flexibility would require a change in Federal law.

Figure 66: Urban transit oriented development*[1]



*Source: *Cambridge Systematics et al.*, The LUTRAQ Alternative: Analysis of Alternatives, 1000 Friends of Oregon, Portland 1992.

1 An indicative arrangement of development around light rail transit stops, with a mix of moderate to high density housing, shopping and civiv facilities, and parks.

This cordon has resulted in a strong increase of density inside its limits and increased tax income, allowing the construction of a double urban rail system, public spaces and an increased liveability, confirmed by comparative surveys.

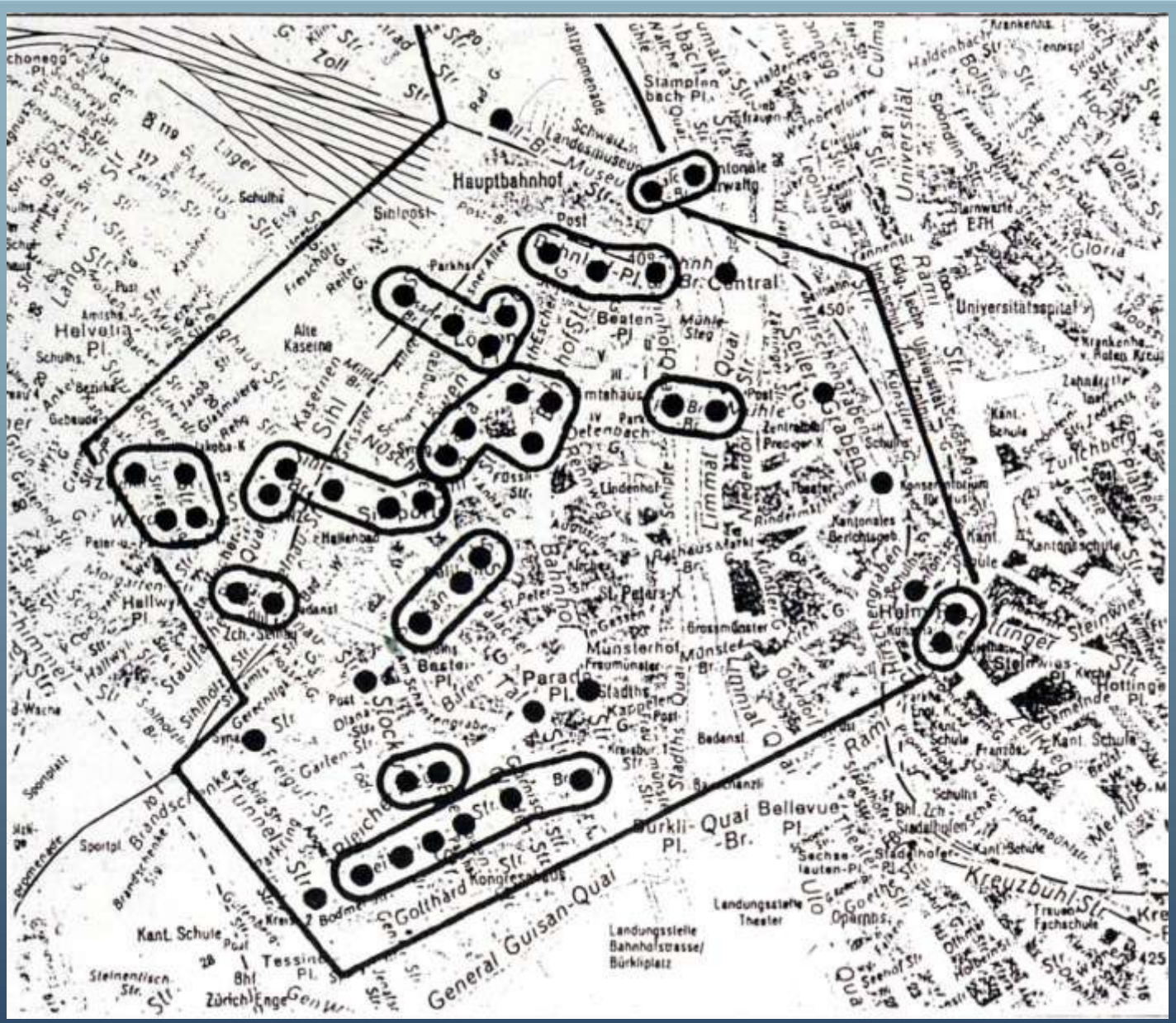
Former industrial buildings have been gradually transformed into public service, commercial and residential uses. There has been no transfer of development rights but benefit sharing through the tax system.

4.3. ZURICH (whole city)

Zurich land use and mobility management:

In Zurich, trams and buses enjoy absolute priority on street. When approaching a traffic light the sensor (shown on the lower left) ensures they have a green light at any time of the day. The reliability of timetables makes public transport the city's fastest mode of transport. Modal split is around 80% in favour of public transport.

Bahnhofstrasse © Zürich Tourismus/Bruno Macor



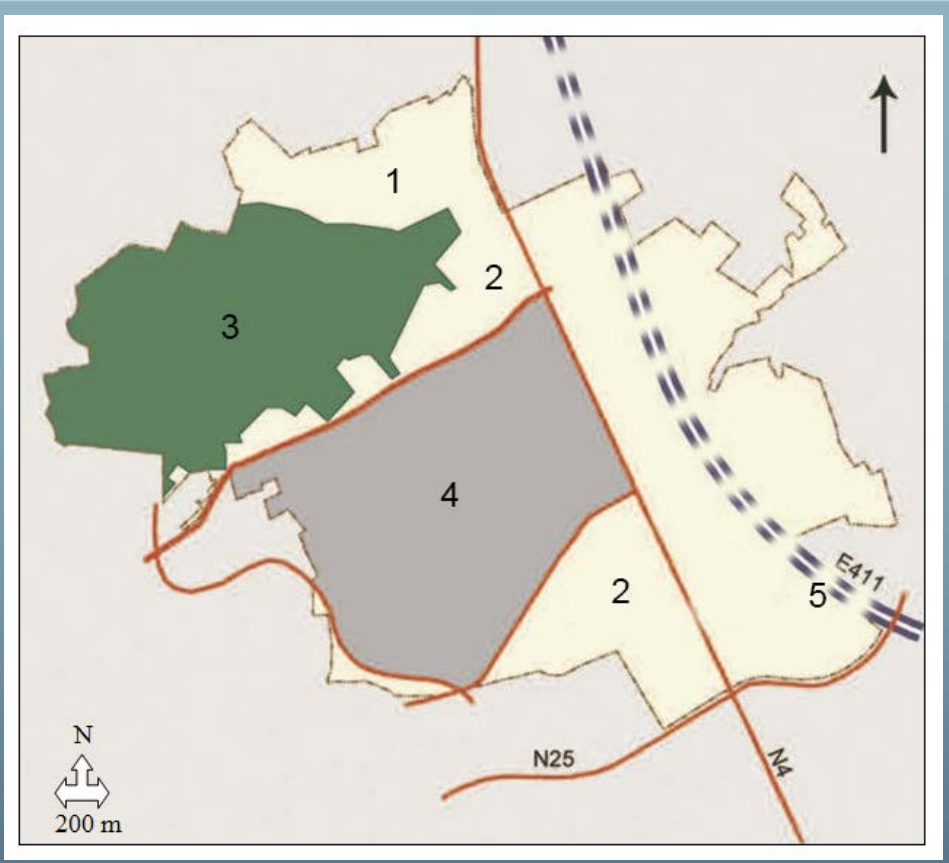
The “Green wave” and long traffic light cycles have been replaced by very short traffic light cycles, favouring pedestrians.

Zurich parking management

Unrestricted on-street parking is exclusively reserved for Zurich-registered residents, while car commuters entering the city from other municipalities are subject to limits on their parking time. This parking measure has allowed a large-scale return of inhabitants to the city, has benefitted the public car parks and has been politically rewarding for the city fathers, while suburban rail travel has been made easier.

4.4. Louvain-la-Neuve (near Brussels)

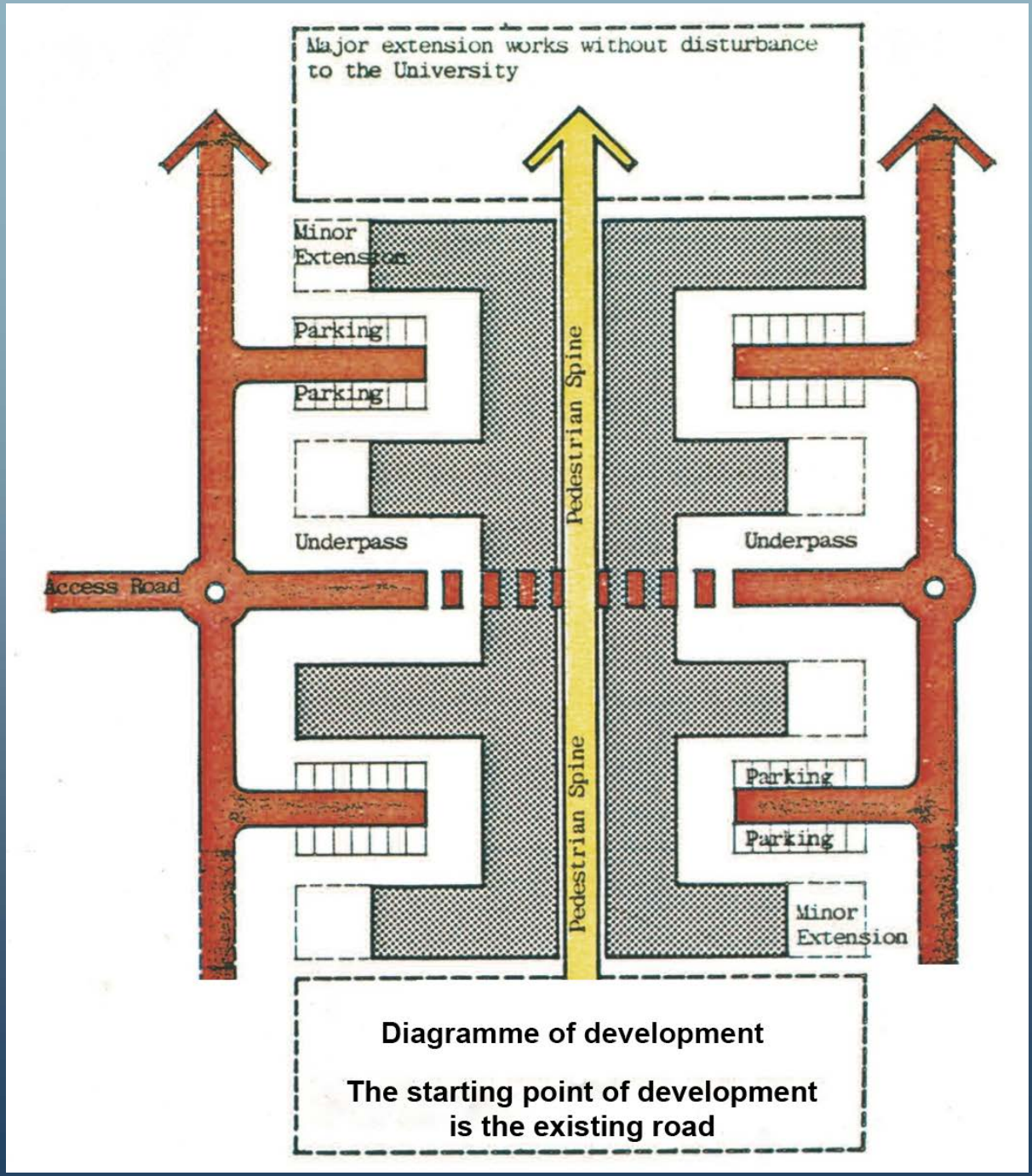
The 920 ha of land acquired by the university in 1969. The anchoring of the new town is on the only existing infrastructure, i.e. the N4 road linking Brussels to Namur and Luxemburg.

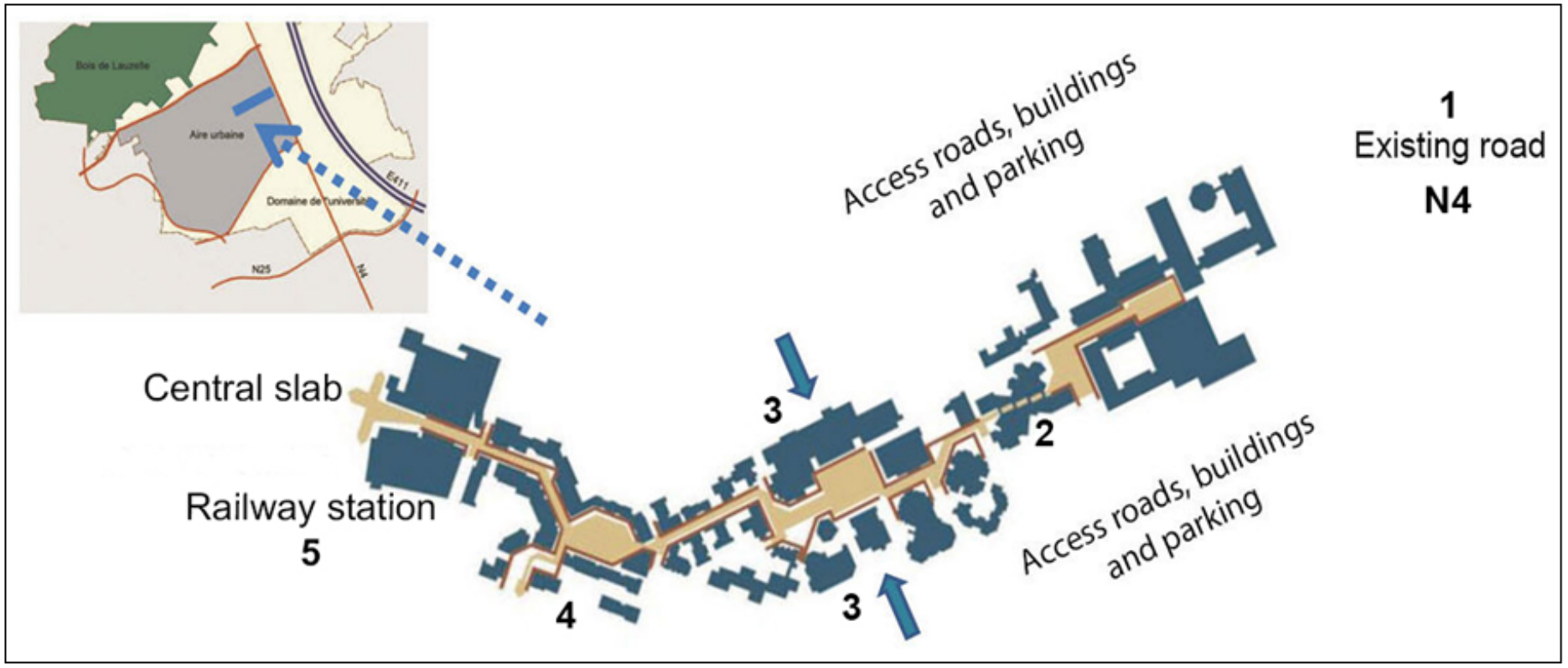


The E411 motorway did not exist at that time and is presented in dotted lines. Dense mixed-use urban development was restricted to the central part of the site (4). The Northern area in green was reserved as forest (3). The area East of it and South of the dense urban development became a research and development park (2). The area North of the forest was developed as a golf course (1). The area east of the N4 road became extensions of the research and development park.

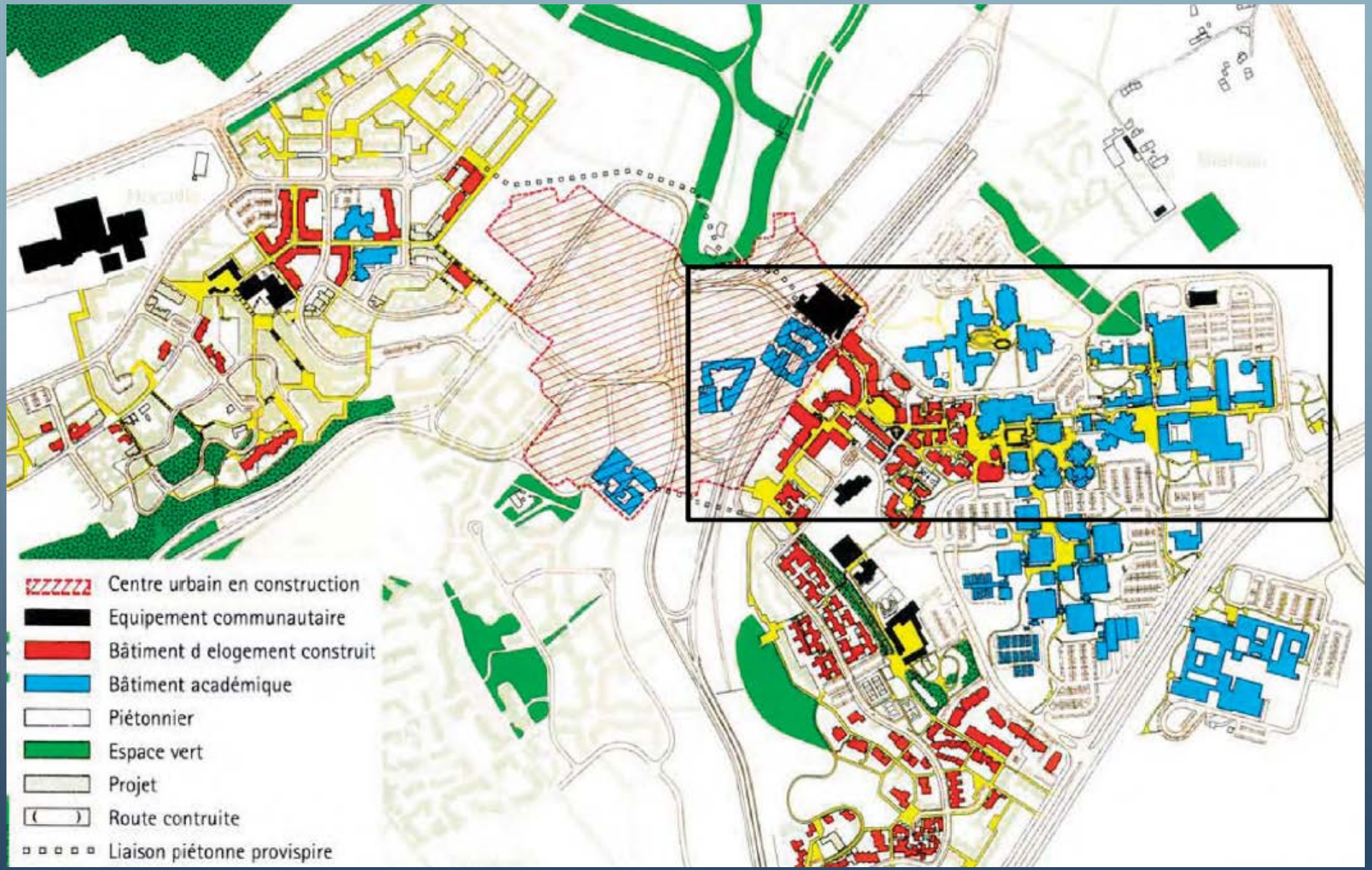
Planning for uncertainty (stop and go).

Starting from the existing main road a linear pedestrian central spine – in line with example of the new Lancaster University development plan - allows a step-by-step mixed urban development. Car access to buildings and parking is placed outside the spine, with occasional underpasses.





The first phase pedestrian spine. The Eastern starting point is the existing N4 road (1), followed by a string of public spaces and passages through buildings, indicated by dots (2). The diagram indicates the location of access roads and parking lots. The arrows indicate the automobile pass under the "Place des Sciences"(3). The piazza's have different shapes and their street access is either perpendicular or tangential (4). The underground railway station (5) marks the beginning of the undergound slab.


Centre urbain en construction
Equipement communautaire
Bâtiment d elogement construit
Bâtiment académique
Piétonnier
Espace vert
Projet
Route contruite
Liaison piétonne provispire

The centre of the first phase was the science library, a huge concrete building seen as the cathedral of a university town with its plaza (parvis), above a vehicle underpass. It is a social meeting place with university buildings, shops and restaurants (architect A Jacqmain). The first phase of the linear development started in 1972, from the existing road (N4). From 1976 an underground railway station was brought into service. The street and road network was developed stepwise, as required by the needs of urban development.

Parking. All of the parking spaces are planted with different tree species in order to attract different kinds of birds. They have become an ornithological reserve.

The station. The arcaded entrance of the station (architect Y Lepere) on the arcaded pedestrian spine is the place where the slab starts.

The functioning of the slab

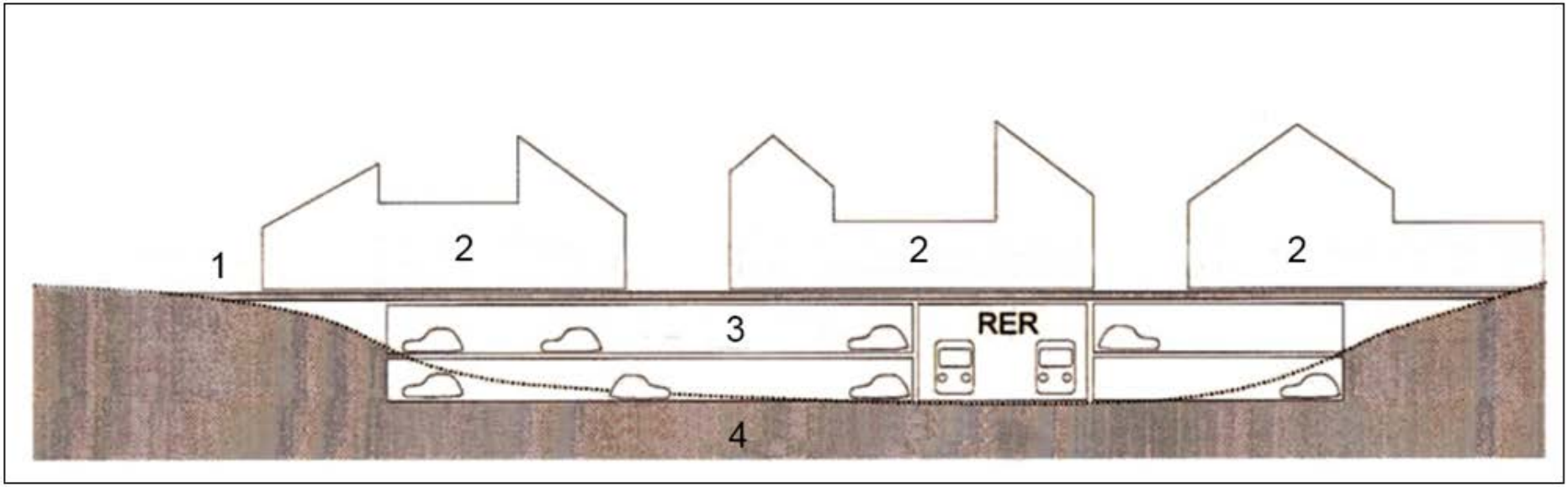


Diagram of the slab. The slab is covered by offices and apartments, with shops on the ground floor (1) and a high density – low rise commercial streets network that can be considered as “architectura minor” (standard architecture), in contrast to a few iconic buildings, such as the S-bahn (RER) rail station, which are considered as “architectura major”. The underground slab was financed by its infrastructure users: the rail and parking operators (3), by renting it as storage space, and by leases on the commercial space above it (2). No speculative high rise was included in the master plan. The ground below the slab remains property of the university, just as the rest of the site (4).

Cafés and restaurants adjoin pedestrian spaces while cars must use the underground parking.

All storm water is collected in an artificial lake that serves as a reservoir and an amenity. The banks provide room for flooding.

Pre-monitoring of water entering the lake, and of oxygen levels, allows the water quality for fishing to be checked.

An aerial view of the city taken in 2014 shows the high- density low-rise character of most of the development and the potential for further extensions close to the lake.

Similar examples of land water interface have multiplied

The concept of separating storm water and waste water collection was brilliantly implemented in the long new park and lake of Billancourt, running parallel with the river Seine. The park is only flooded during peak winter rainfall. All storm water is collected from the building blocks. At times of flood the lake is under water. In no circumstances is the sewage water allowed to combine with rain water and flow into the Seine (H Bava, Agence TER). This concept has achieved huge savings in water collection infrastructure.

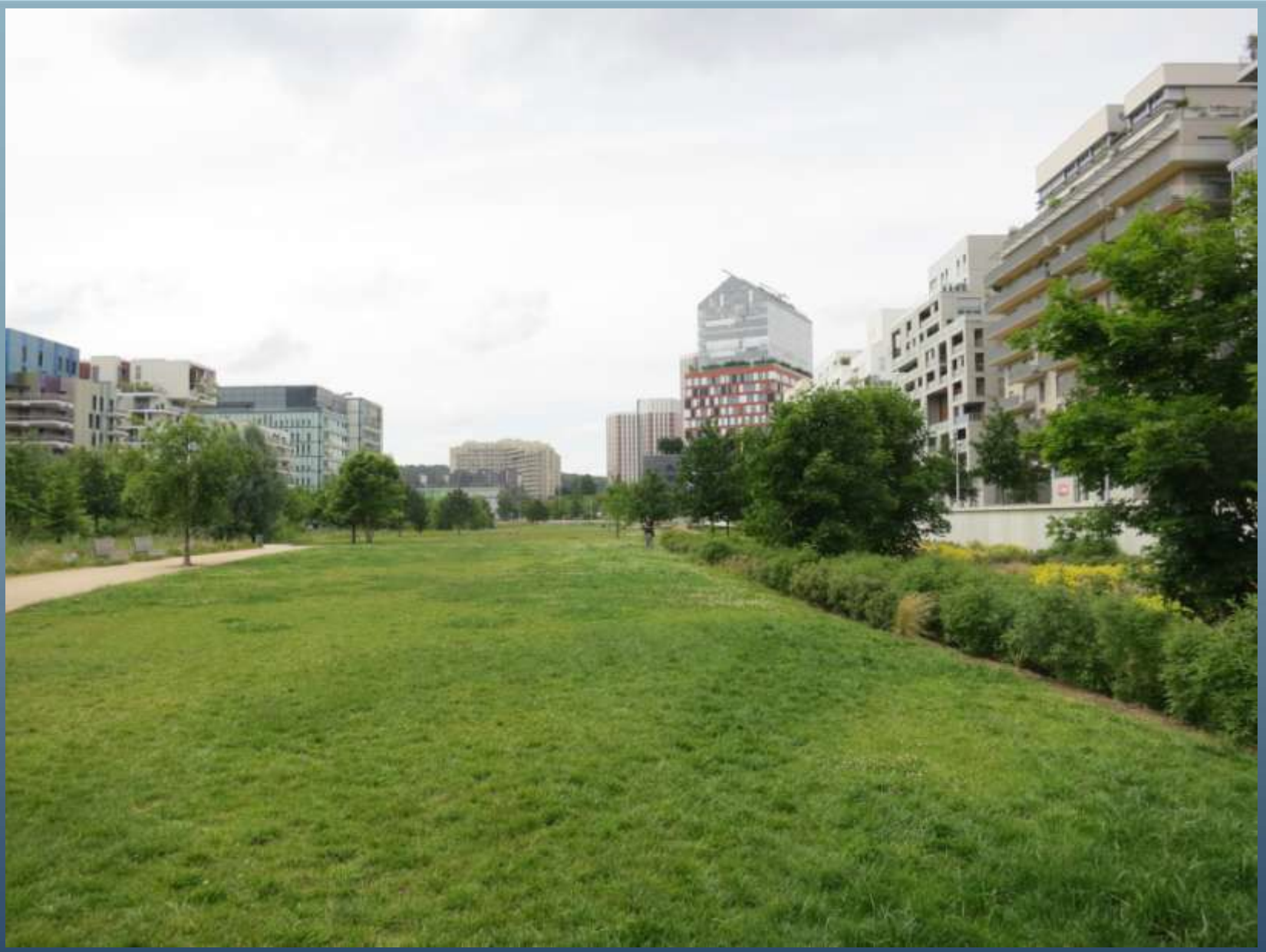
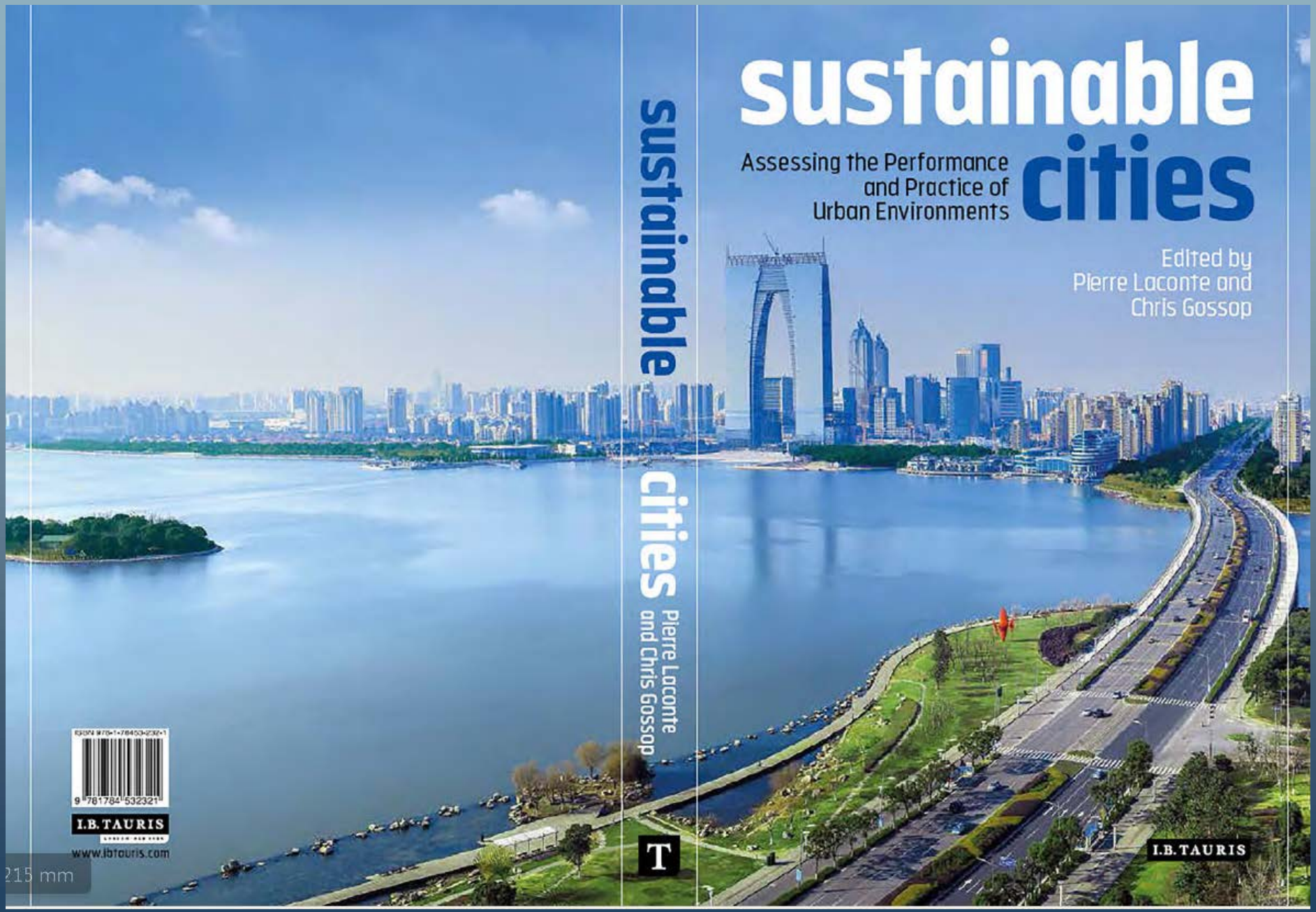


Photo Pierre Laconte

New “park/lake” of Billancourt : high density mixed development at Billancourt-Trapèze (near Paris).


sustainable cities
Assessing the Performance and Practice of Urban Environments
Edited by Pierre Laconte and Chris Gossop
I.B.TAURIS
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sustainable cities
Pierre Laconte and Chris Gossop
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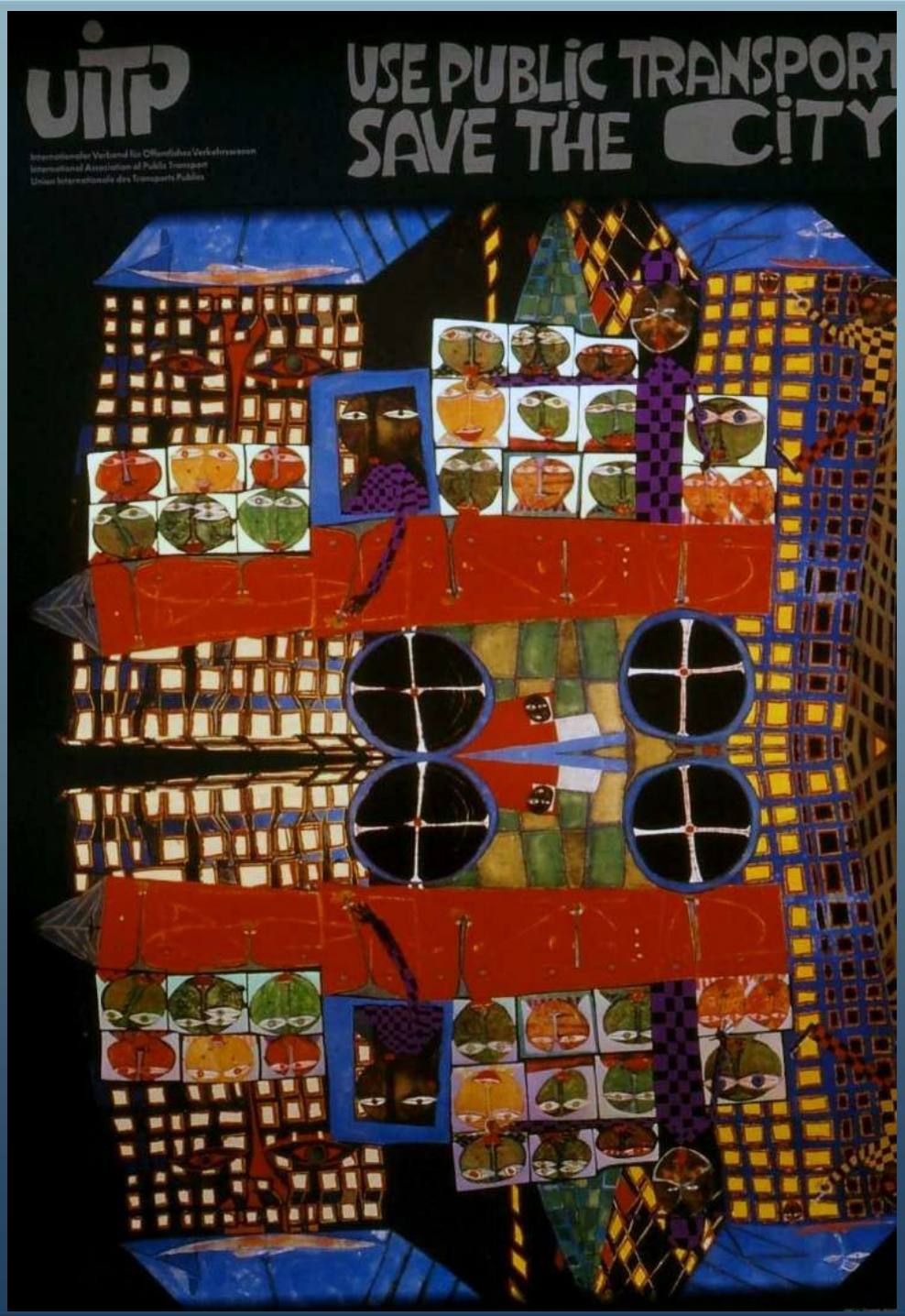
This book is about evaluating our urban environments and assessing the progress being made towards cities that are sustainable. The first part examines the built environment at three levels of observation – individual buildings, urban neighbourhoods and entire cities and towns. While charting the genuine improvements made it also reveals the scale and complexity of the task ahead.

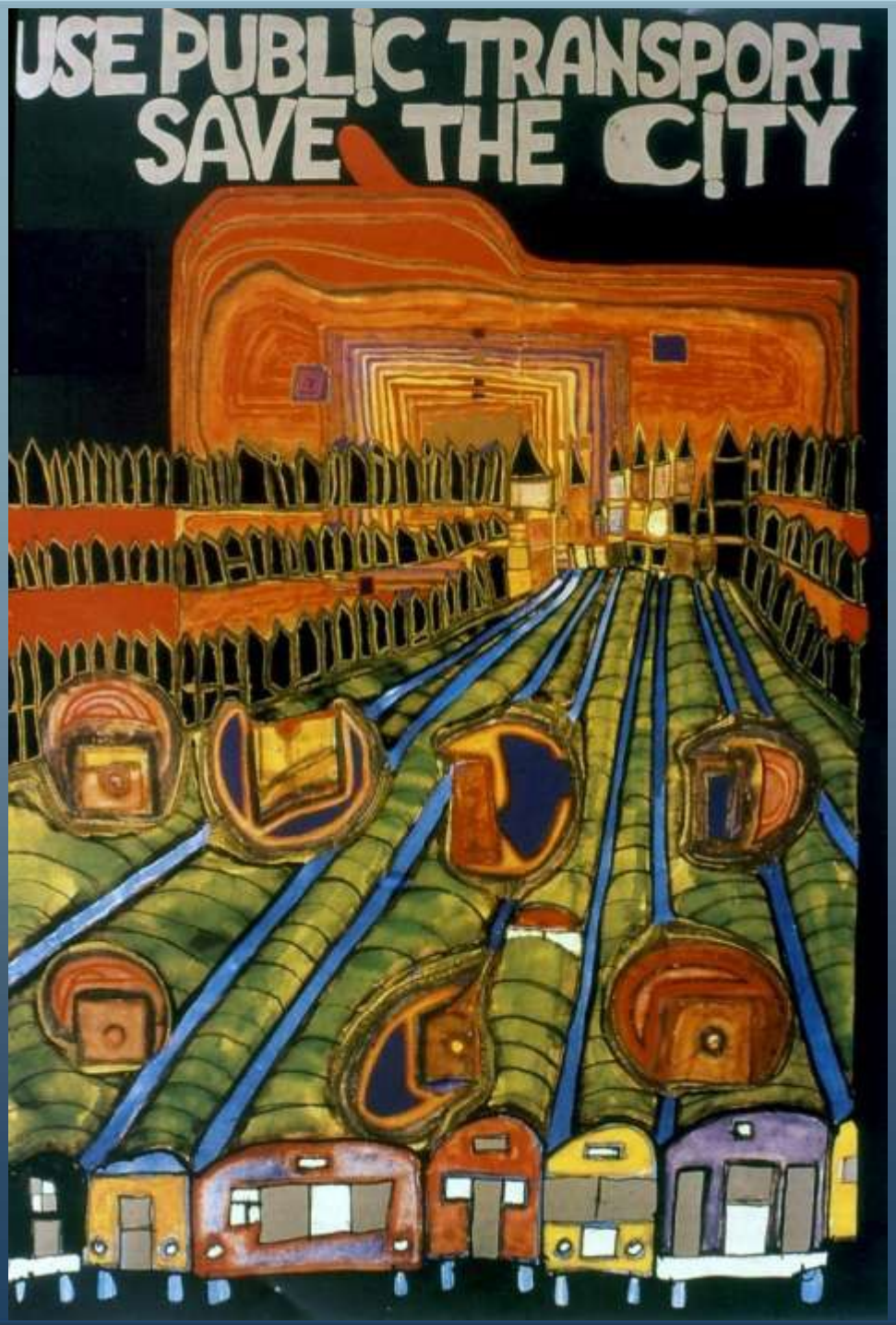
The second part offers a critical assessment of the techniques used to assess urban development, including the measurement of greenhouse gas emissions, ecological footprint analysis, and the assessment of urban biodiversity. It concludes with an alternative approach to CO2, making the case for this greenhouse gas to be seen as a resource, rather than as a liability.

The third part presents cases of best practice, including Manchester's waterfront, urban transport in France, Amsterdam's ring canals, London's King's Cross development and Hamburg's energy efficient district.

AN ARTIST'S PERSPECTIVE

Three posters by Hundertwasser illustrate the planning vision of a sustainable city : high-density compactness, transport corridors served by public transport, and amenities making the city enjoyable.

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