‘Human Habitats today have become centers of energy consumption. By conserving energy with appropriate building design, reducing energy by efficient energy management and producing energy with decentralized systems that allows feeding surplus energy into the grid, we can create a shift towards energy positive habitats. Essential to this movement is the fact that humans have to change their life styles to consume less energy.’
Energy, Habitats and Lifestyles: The Quest for *Regenerative Cities*

Herbert Girardet
1. From “Agropolis“ to “Petropolis“
2. The city as eco-predator
   - Fossil fuels and urban growth
   - Cities and the climate crisis
3. Sustainable or regenerative urbanisation?
   - Towards “Ecopolis“
   - The renewable energy revolution
   - Towards a circular metabolism
   - Integrated urban planning
   - Creating the regenerative city
Montereggioni, Tuscany
“Petropolis”

Central city

Navigable river

Air imports(exports)

Road imports(exports)

Rail imports(exports)

Sea imports(exports)

Global communications

Oil imports

Food imports

Motorway links

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London
The Great Acceleration

1950 marked the beginning of a massive acceleration in human activity and large-scale changes in the Earth system.

DESIGN: 3phleb.org
Urban growth & resource use

- From 1900 to 2000 human numbers increased four fold – from 1.5 to 6 billion
- Resource consumption and urban populations went up sixteen fold
- By 2050 two thirds of humanity are expected to be urban dwellers
- Already cities, on 3-4% of the world’s land surface, use 80% of its resources, and discharge most wastes
- What will further urbanisation mean for the condition of the biosphere?
- Can large, modern cities be a viable, resilient home for humanity?
Dubai
Urban GDP Growth to Outpace Rural

<table>
<thead>
<tr>
<th>Year</th>
<th>India GDP per capita (thousand rupees)</th>
<th>China GDP per capita (thousand renminbi)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2005</td>
<td>58</td>
<td>24</td>
</tr>
<tr>
<td>2015</td>
<td>110</td>
<td>52</td>
</tr>
<tr>
<td>2025</td>
<td>185</td>
<td>99</td>
</tr>
</tbody>
</table>

India Urbanization Model; McKinsey Global Institute China All City Model, January 2010; McKinsey Global Institute analysis
Our Shrinking Earth

YEARS
- 1900: 7.91
- 1950: 5.15
- 1987: 2.60
- 2005: 2.02
- 2030: 1.69
- 2050: 1.44

Hectares of Land Per Capita
"Ecopolis"

- Central city
- Navigable river
- Market gardening and community supported farms
- Nature park and community orchard
- Mixed farming and renewable energy
- Grazing and forests
- Air imports/exports
- Road imports/exports
- Sea imports/exports
- Global communications
- Renewable energy

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Glasgow
Munich
Germany‘s Feed-In Tariffs, 2000 – 2012

- Secure investment in renewable energy with 7% return
- 380,000 jobs created, €27.5bn turnover for RE companies, €10bn investment per year
- Reduced imports: €8 billion euro fuel imports avoided
- Reduced emissions: 120 million tonnes of CO2 saved
- Eco-benefit: €5.40 less environmental damage per household/ month
- Total cost: €6.00 per household/ month
- Growing share of power: 2008: 18% of electricity supply
- At current growth rates renewables will provide 40% of electricity by 2020, or 100% by 2050
Adelaide 2012

- Over 20% of renewable electricity, 40% by 2020
- 120,000 PV roofs (of 600,000 houses) = 250 mw
- 20,000 ha of peri-urban horticulture
- Recycled waste water used in crop irrigation
- Nearly 100% composting of organic waste
- Water sensitive development
- 60% carbon reduction by municipal buildings
- 1000s of new green jobs
- Nearly 3 million trees planted on 2000 ha
Shanghai
Relationship between Transport and Land Use

A commonly used study of 32 cities by Newman & Kenworthy in 1989 concluded that there was a strong link between urban development densities and petroleum consumption.
Ecopolis

- Central city
- Navigable river
- Market gardening and community supported farms
- Nature park and community orchard
- Mixed farming and renewable energy
- Grazing and forests
- Air imports/exports
- Road imports/exports
- Sea imports/exports
- Global communications
- Renewable energy
- Renewable energy

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Tianjin, Singapore
Food City, Dubai
Regenerative cities: The key issues

- Making urban systems compatible with the world’s ecosystems
- Regenerative energy systems
- Regenerating soils
- Replenishing plants nutrients
- Regenerating forests
- Regenerating water courses and lakes
- Regenerating community life
A GIANT FOOTPRINT

The city on the left wastes resources:
- It gorges itself on meat, with animals fed mainly on imported feeds
- It uses timber and paper products without concern about their forest origins
- It emits vast amounts of CO₂, requiring vast areas of vegetation to reabsorb it

A NIMBLE FOOTPRINT

The city on the right takes another chance:
- It citizens limit their meat consumption, preferring vegetable foods
- Timber and paper are used frugally and efficiently
- Tree planting schemes assure reabsorption of its limited CO₂ output
Books and Reports


- Cities, People Planet, 2004 & 2008

- A Renewable world, 2009

- Regenerative Cities, 2010

- Regenerative Adelaide, 2012

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