Creating Regenerative Cities

Herbert Girardet

Presentation outline

The circular economy is the only way', Janez Potočnik

- **Resource use in an urbanising world**

- **From *Agropolis* to *Petropolis***

- **From urban sprawl to eco-footprints**

- **Urban ecology: From linear to circular**

- **Beyond sustainability: creating *regenerative* cities**

- **The Adelaide case study**

- **The Bristol region**

- **Can we create *Ecopolis?***

Rio+20: Sustainable Cities

"...if well planned and developed ... through integrated planning and management, cities can promote economically, socially and environmentally sustainable societies. We recognize the need for a holistic approach to urban development and human settlements...."

"Agropolis"

Legend:

- Town
- Navigable river
- Market gardening and milk production
- Firewood and lumber production
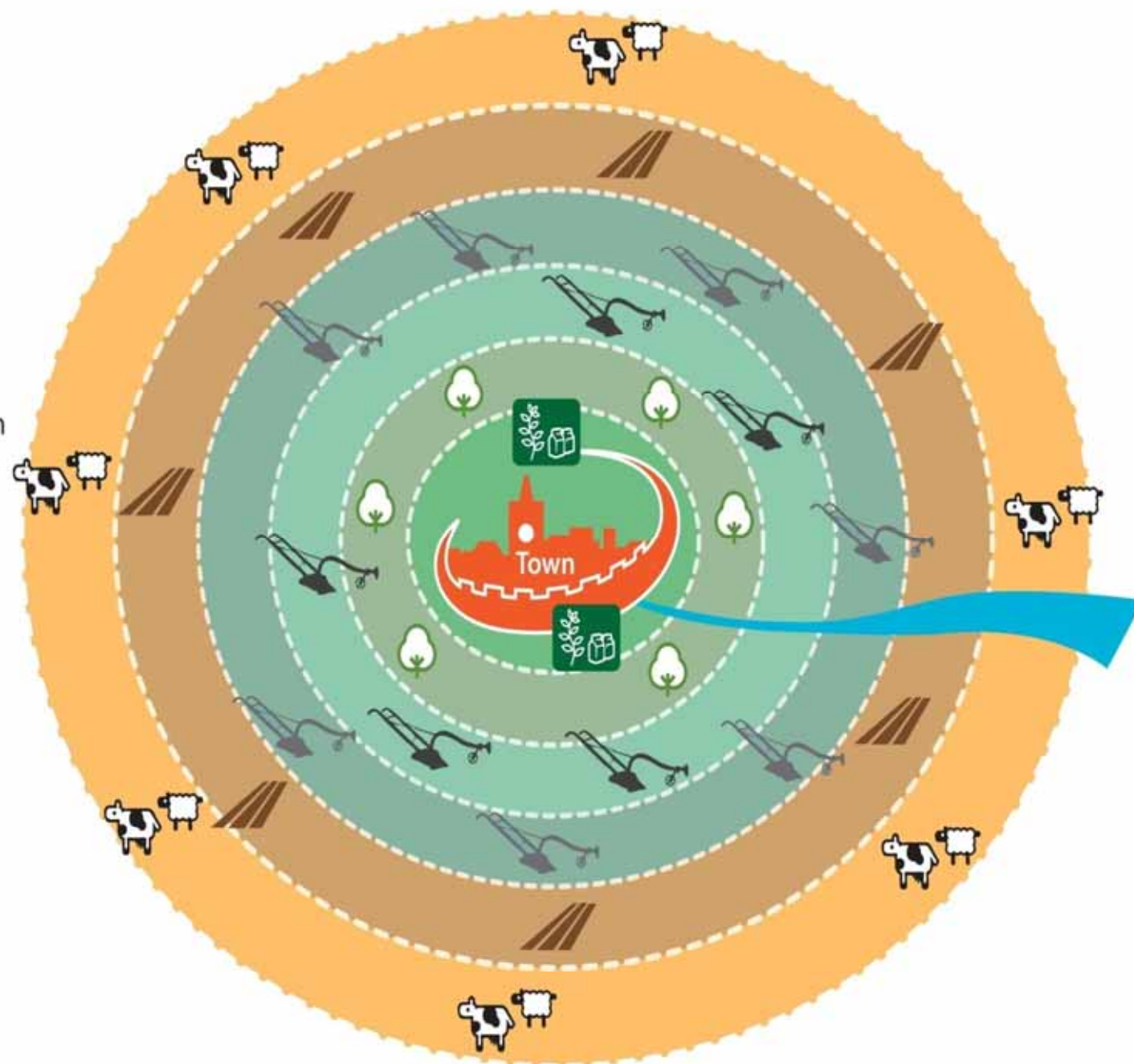- Crop farming without fallow
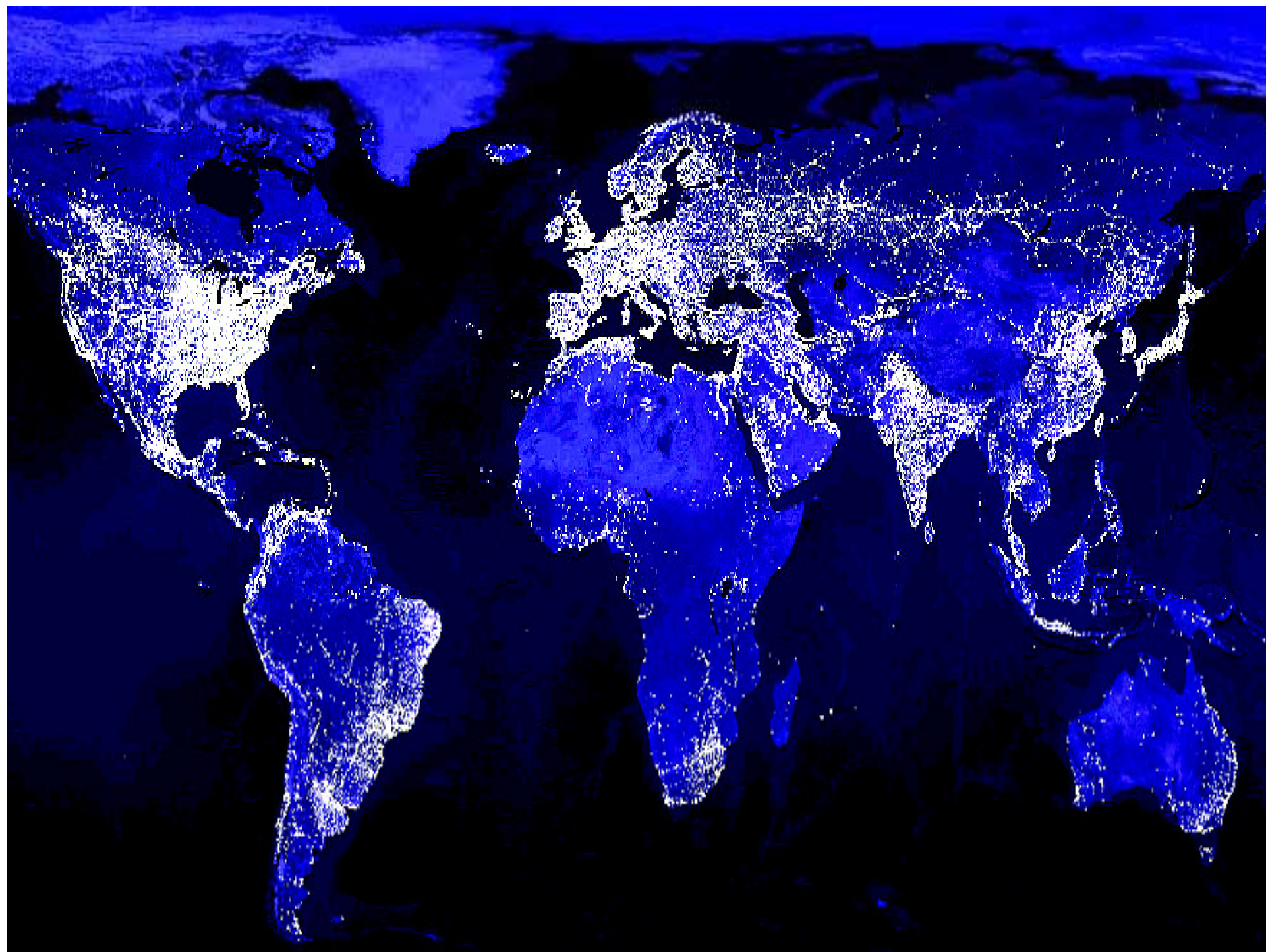- Crop farming, fallow and pasture
- Three-field system
- Livestock farming

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London

"Petropolis"

Central city

Navigable river

Air imports/exports

Road imports/exports

Rail imports/exports

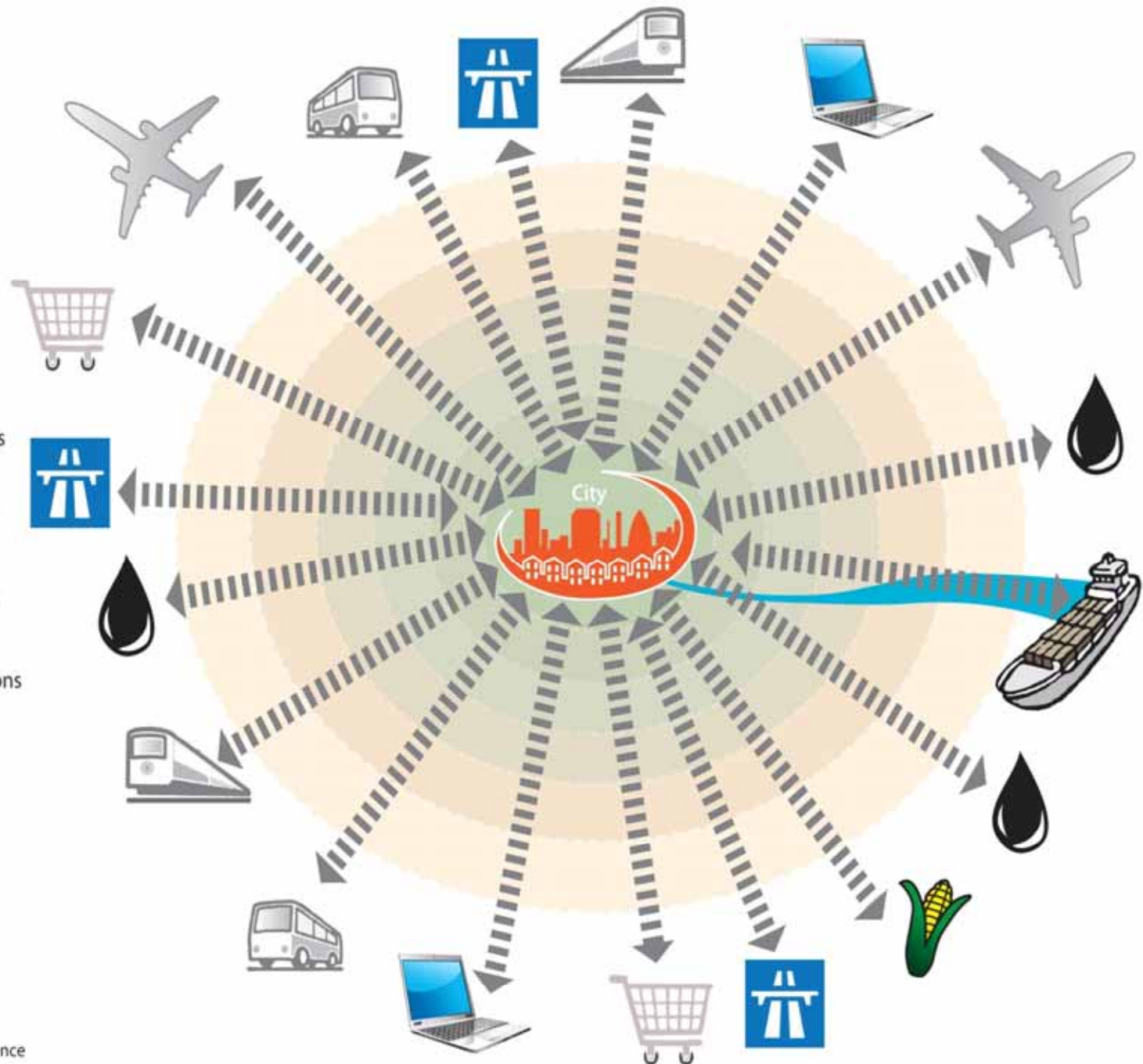Sea imports/exports

Global communications

Oil imports

Food imports

Motorway links

City

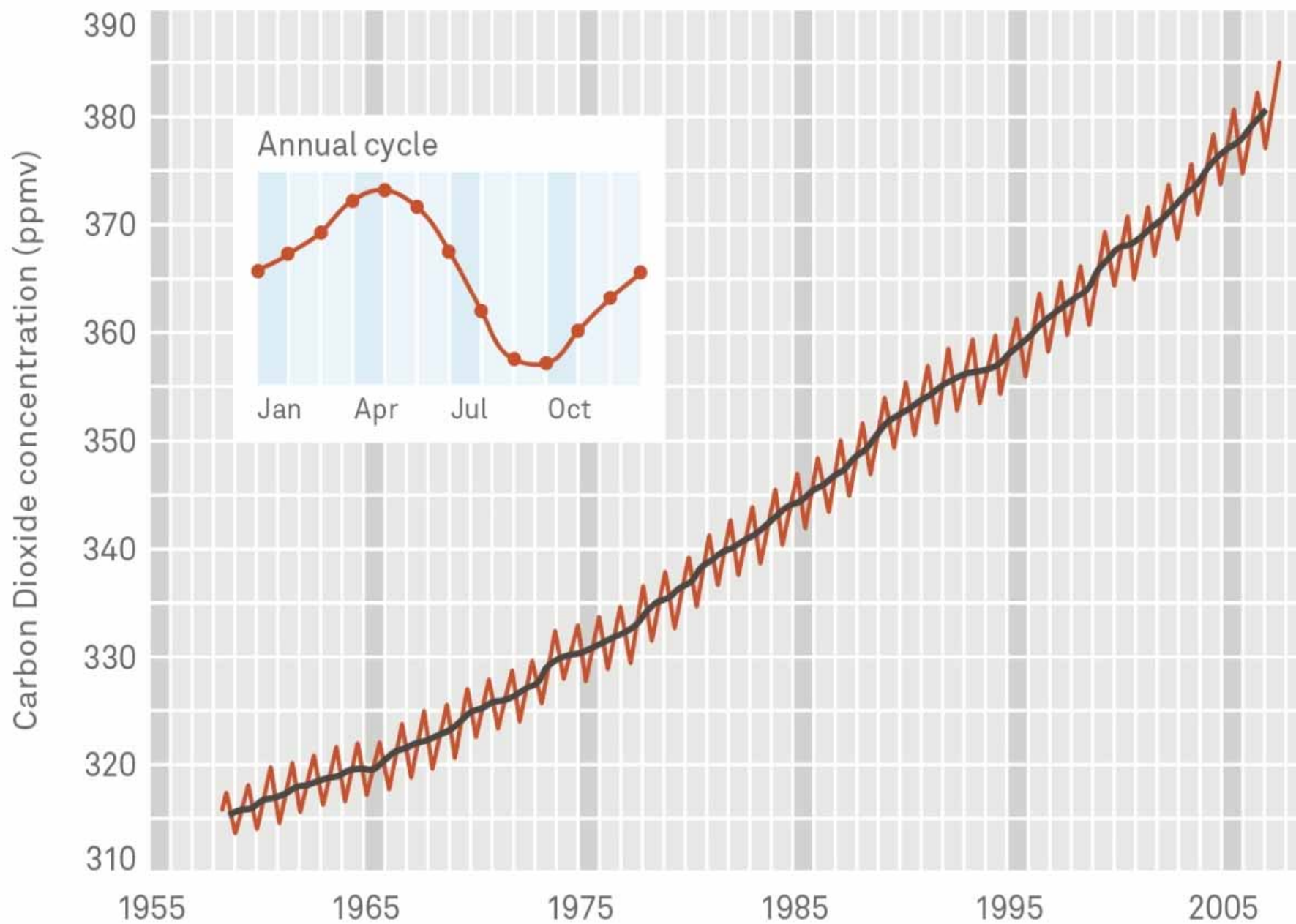© copyright Herbie Girardet/Rick Lawrence

Atmospheric Carbon Dioxide

Measured at Mauna Loa, Hawaii

Carbon Dioxide concentration (ppmv)

390
380
370
360
350
340
330
320
310

1955   1965   1975   1985   1995   2005

Annual cycle

Jan   Apr   Jul   Oct

The age of the city

- **From 1900 to 2000 human numbers increased four fold – from 1.5 to 6 billion**
- **The global *urban* population grew 13 fold to 2.9 billion, nearly 50 % of the world population**
- **By 2030, 60% of the world population, or 4.9 billion people, are expected to live in urban areas, 3 times more than the world's entire population in 1900**
- ***Cities, on 3-4% of the world's land surface use 80% of its resources, and discharge most solid, liquid and gaseous waste***
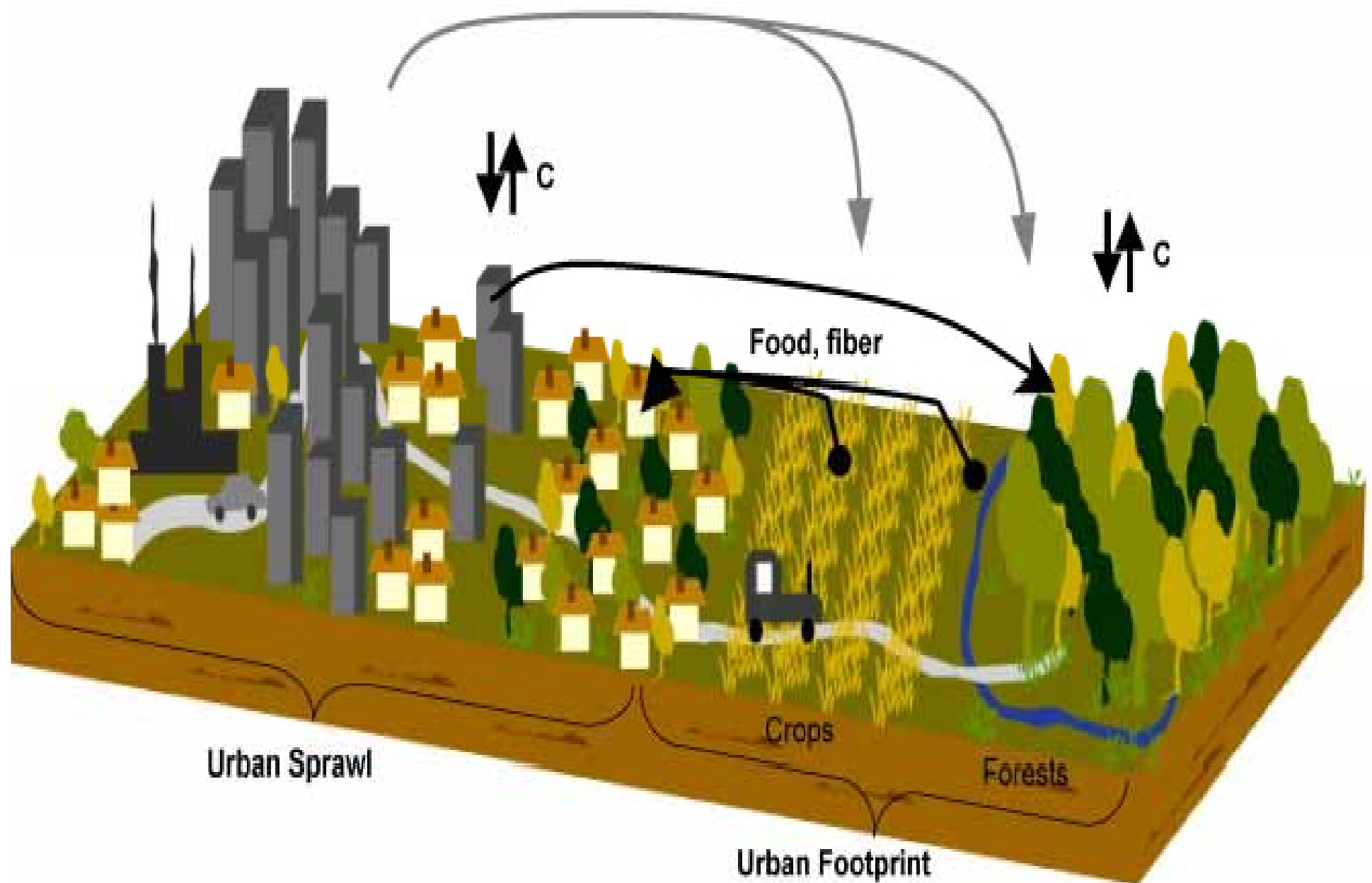
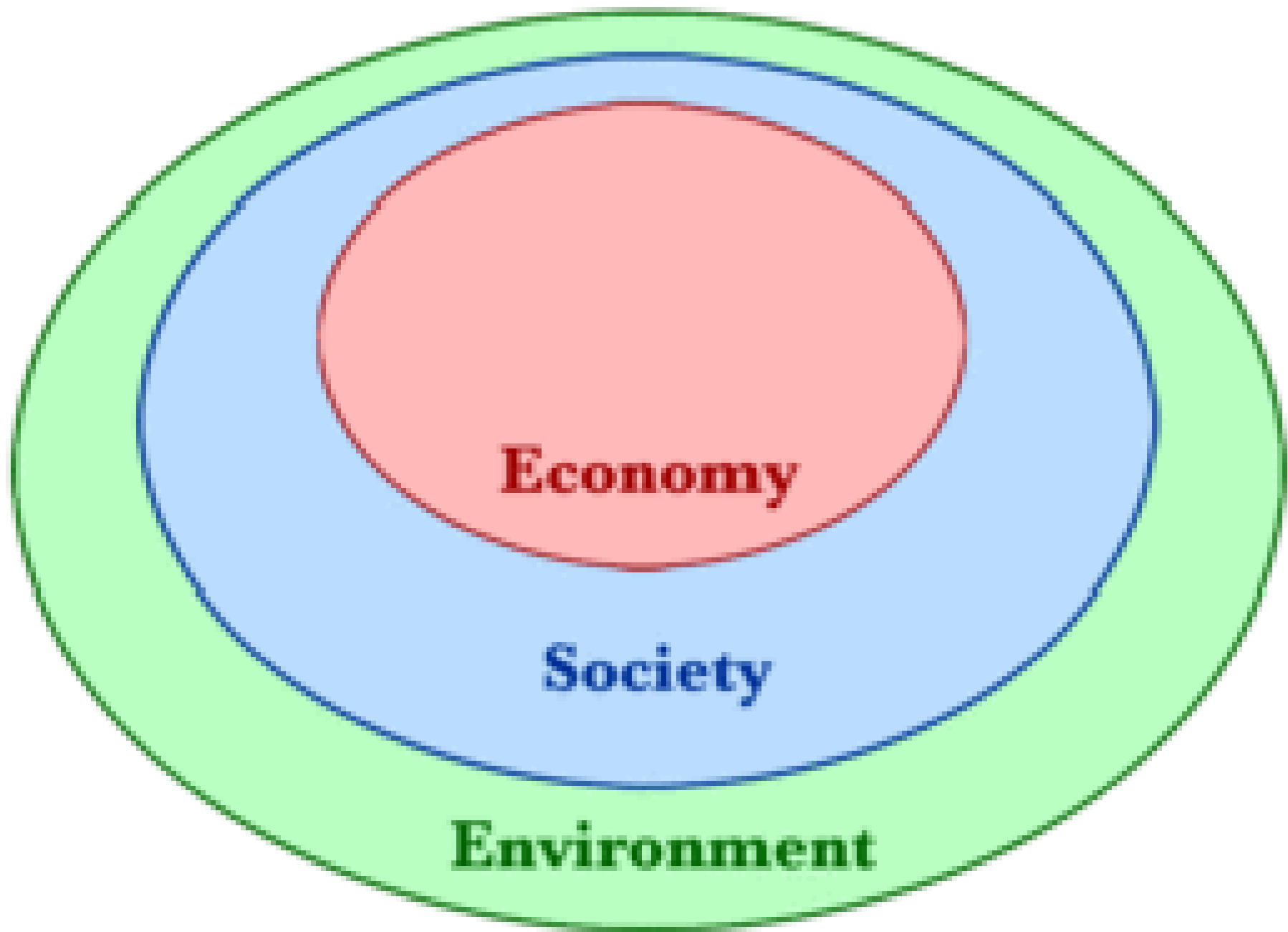# Adelaide

Adelaide, 2003

- 'Thinker in residence' – 9 week period
- Initiated by former S. Australia premier Mike Rann
- Rethinking a city region from an integrated, green perspective
- Collaborative process
- Involving all local relevant government departments, NGOs, companies, universities, schools, etc.
- Outcome oriented work towards building a green economy

Pollution

C

C

Food, fiber

Urban Sprawl

Crops

Forests

Urban Footprint

Economy

Society

Environment

ie

X5 FACTOR FIVE

NOW: LINEAR METABOLISM

Goods
Water
Fuel
Timber
Food

INPUTS

CITY

OUTPUTS

Waste Gasses

Liquid Waste

Solid Waste
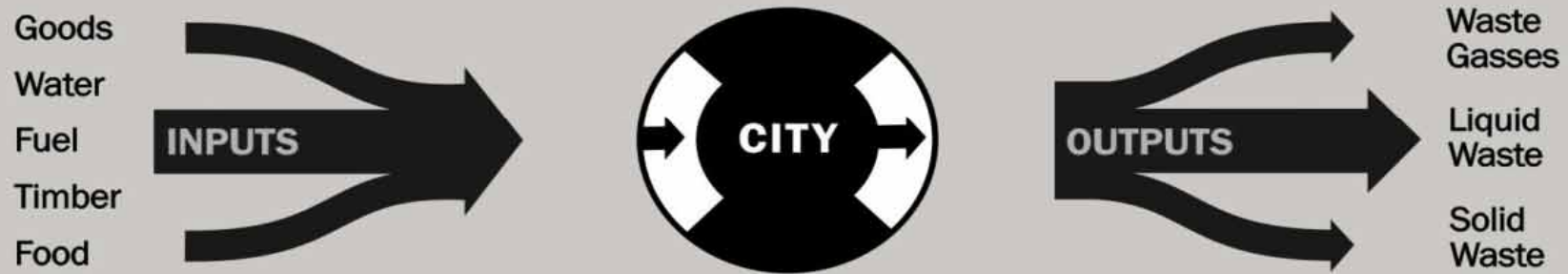
FUTURE: CIRCULAR METABOLISM

Goods
Water
Fuel
Timber
Food

INPUTS

FARM BELT

CITY

FARM BELT

OUTPUTS

Waste Gasses

Liquid Waste

Solid Waste

SMART GRID

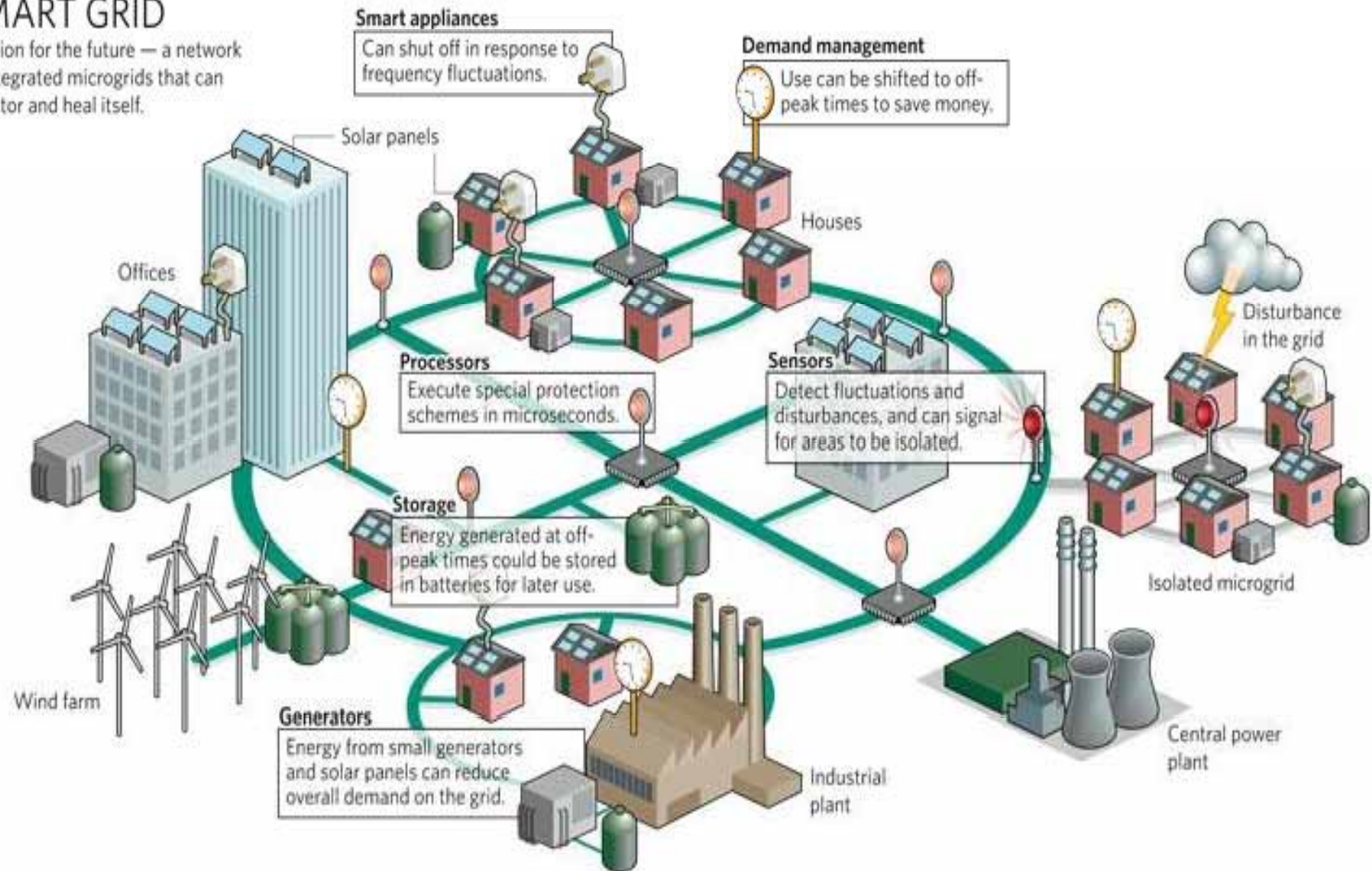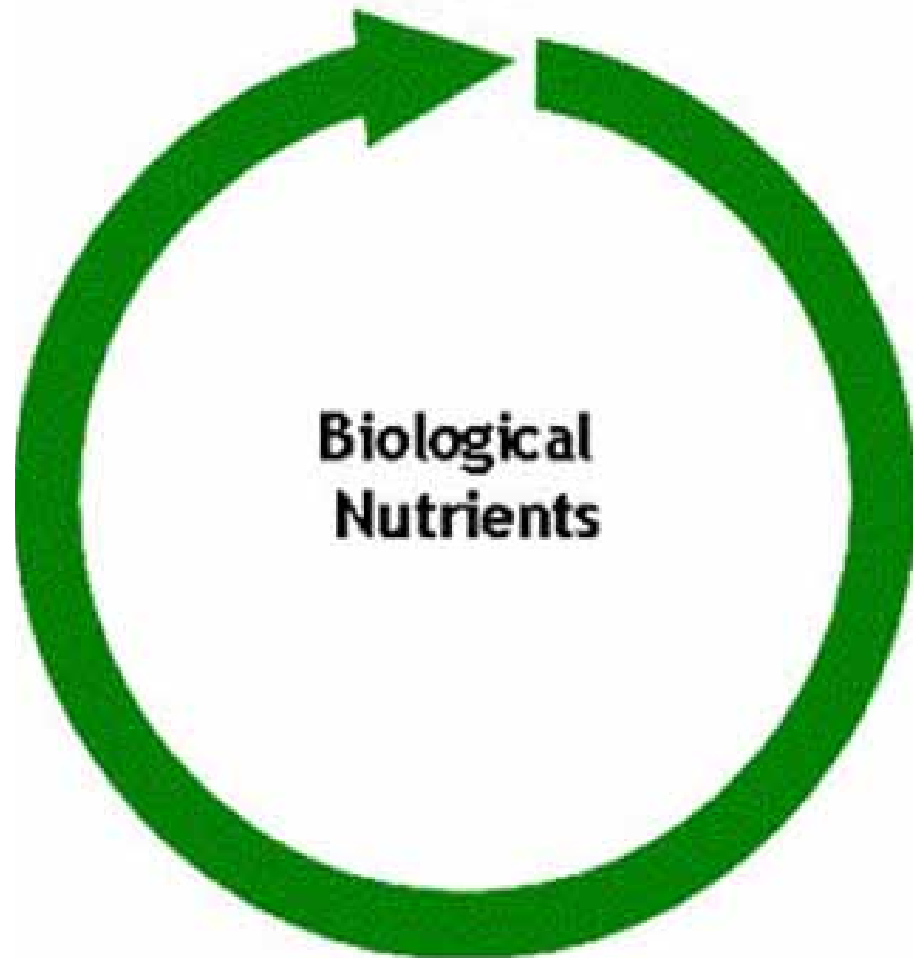A vision for the future — a network of integrated microgrids that can monitor and heal itself.

Smart appliances
Can shut off in response to frequency fluctuations.

Demand management
Use can be shifted to off-peak times to save money.

Solar panels

Offices

Houses

Processors
Execute special protection schemes in microseconds.

Sensors
Detect fluctuations and disturbances, and can signal for areas to be isolated.

Disturbance in the grid

Storage
Energy generated at off-peak times could be stored in batteries for later use.

Isolated microgrid

Wind farm

Generators
Energy from small generators and solar panels can reduce overall demand on the grid.

Industrial plant

Central power plant

Biological Cycle — Biological Nutrients

Technical Cycle — Technical Nutrients

VIRGINIA
DISTRIBUTION NETWORK

Market gardens

Effluent flow

ANGLE VALE

Effluent
discharge
channel

Effluent flow

Bolivar Treatment Plant

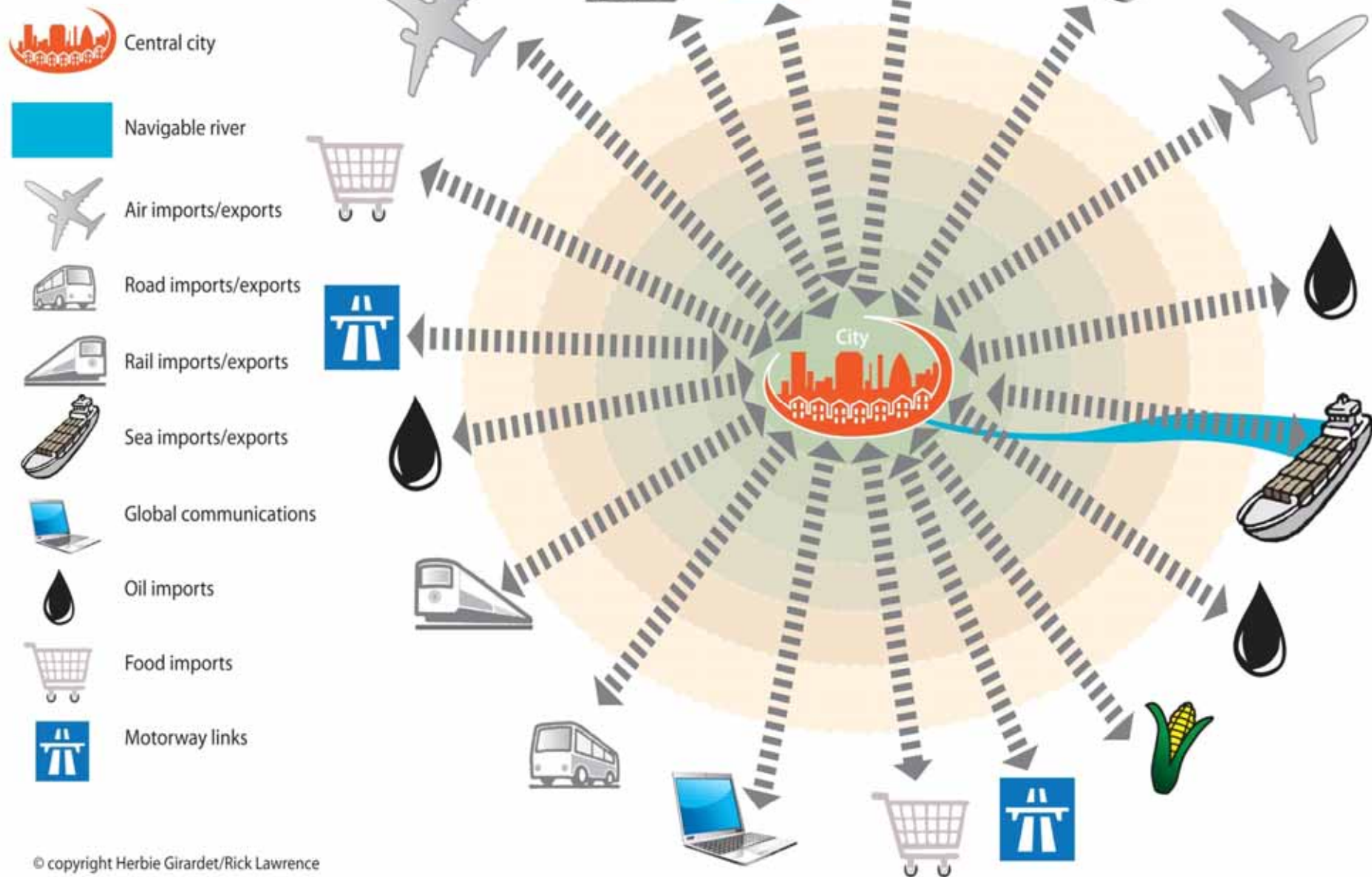Wastewater flow

Gulf St Vincent

ADELAIDE
(NORTHERN SUBURBS)

Adelaide, 2003 to 2013

- ## 30% electricity supply from wind and solar
- 120,000 PV roofs on 600,000 houses = 250 MW peak
- PV roofs on most public buildings
- Solar hot water systems mandated for new buildings
- 3 million trees planted on 2000 ha for CO_2 absorption and biodiversity
- 15% reduction of CO_2 emissions since 2000
- Water sensitive urban development
- 180,000 tonnes of compost made from urban organic waste
- 20,000 ha of peri-urban land used for vegetable and fruit crops
- Reclaimed waste water and urban compost used to cultivate this land
- Large scale-building tune-up programmes across the city region
- 60% carbon emissions reduction by municipal buildings
- Construction of Lochiel Park Solar Village with 106 eco-homes
- ## Thousands of new green jobs

"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

City

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"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
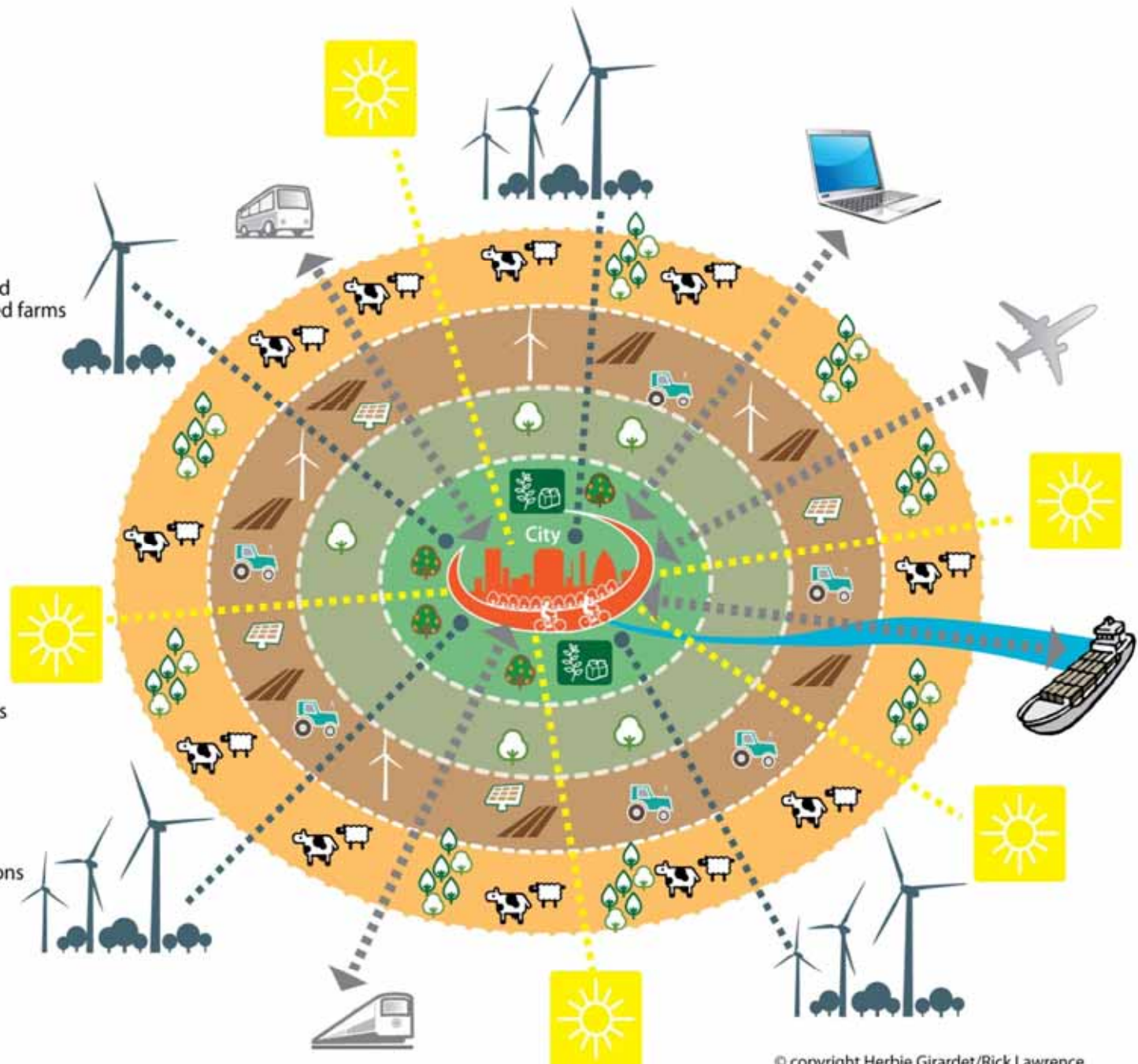
Road imports/exports

Sea imports/exports

Global communications

Renewable energy

Renewable energy

City

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Bristol

Bristol Green Doors

The Bristol Region

SOUTH GLOUCESTERSHIRE

BRISTOL

NORTH SOMERSET

River Avon

BATH & NORTH EAST SOMERSET

West of England Partnership

Population 1.1 Million

- **Four unitary authorities**
- **Joint Transport Executive**
- **Local Enterprise Partnership**
- **Join waste Strategy**
- **Planning and Housing Collaboration**
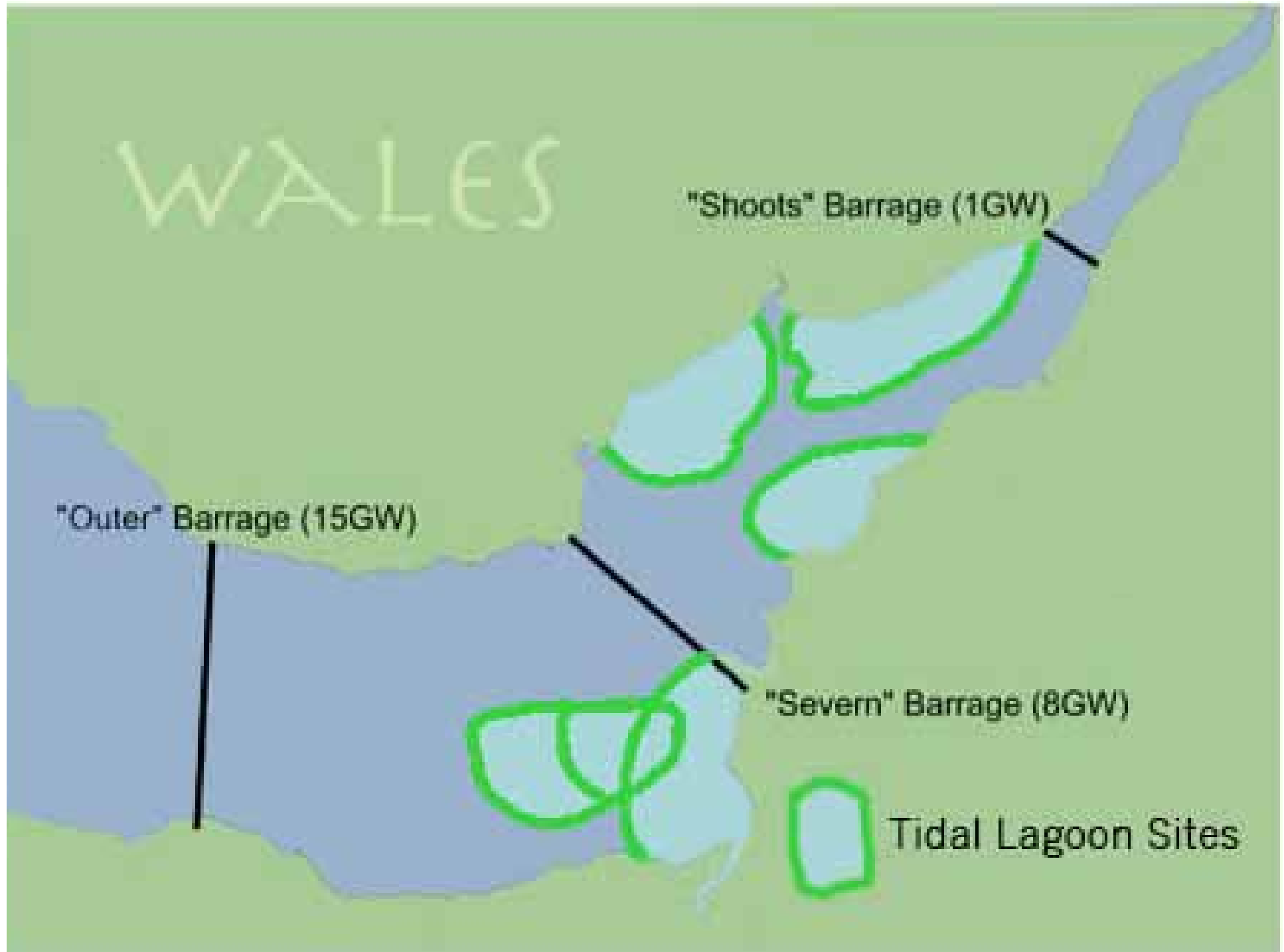- **Inwards Investment**
- **Joint research and statistics**

WALES
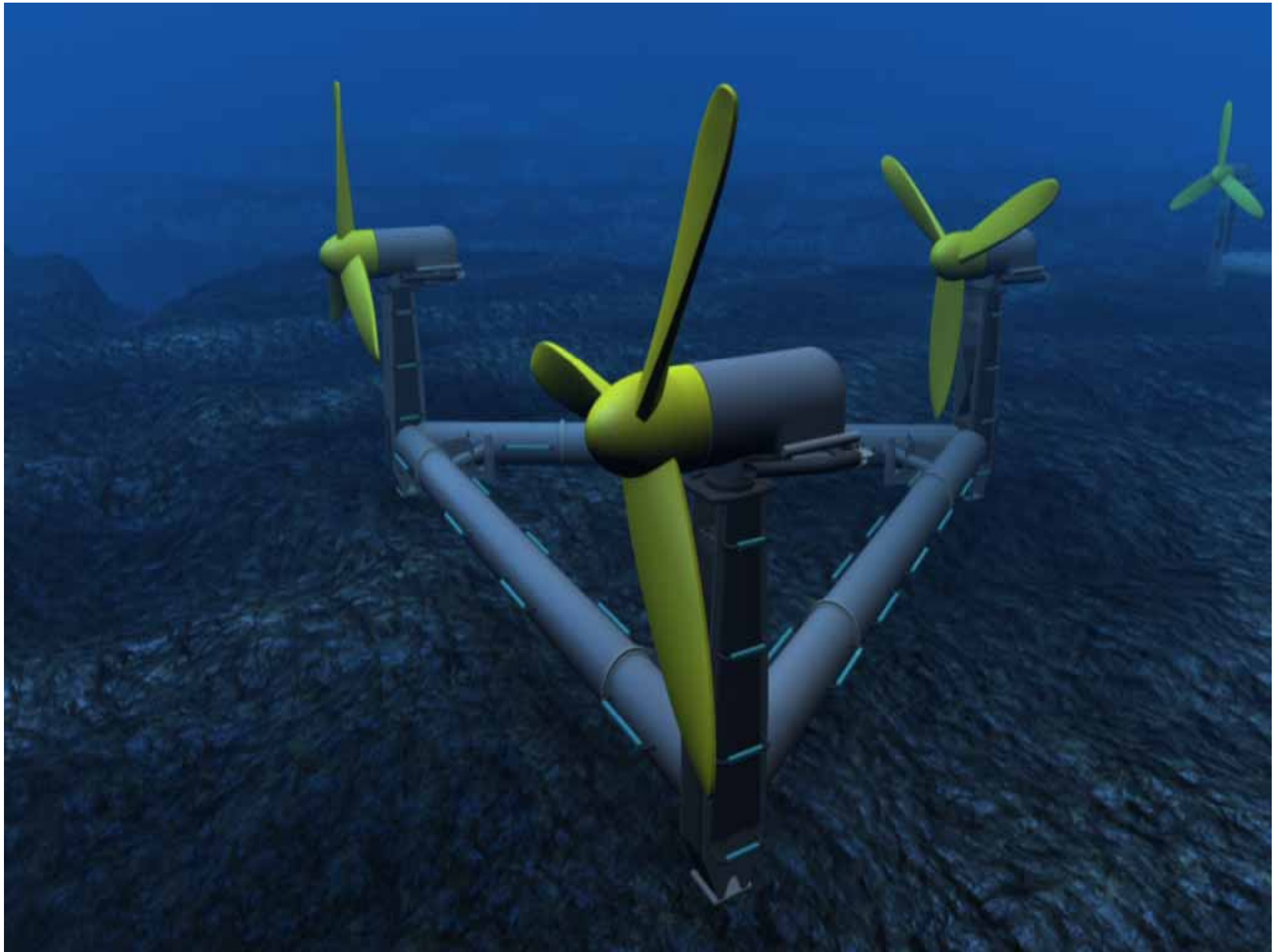
"Shoots" Barrage (1GW)

"Outer" Barrage (15GW)

"Severn" Barrage (8GW)

Tidal Lagoon Sites

Localism: planning for the long term?

- To build for the future we must plan for the long term;

- Re-empowering local communities - unleashing the entrepreneurial spirit in local areas;

- Giving local areas certainty over their future funding for sufficient periods of time.

"First, we need to empower local places by letting them take the initiative to generate local growth, in partnership with central government. With initiative will come responsibility.

And second, we must ensure that the incentives and structures of local places are organised in such a way as to secure the greatest possible economic contribution, with each area able to play to its natural strengths. "

Michael Heseltine, *No Stone Unturned*, 2012

The need to create *regenerative cities*

The importance of *take and give*

- **Efficient renewable energy systems**

- **Regenerating soils with organic matter**

- **Replenishing plants nutrients**

- **Regenerating forests**

- **Restoring watersheds**

- **Regenerative water supplies**

- **Rebuilding human attachment to nature**

- **Building the green economy**
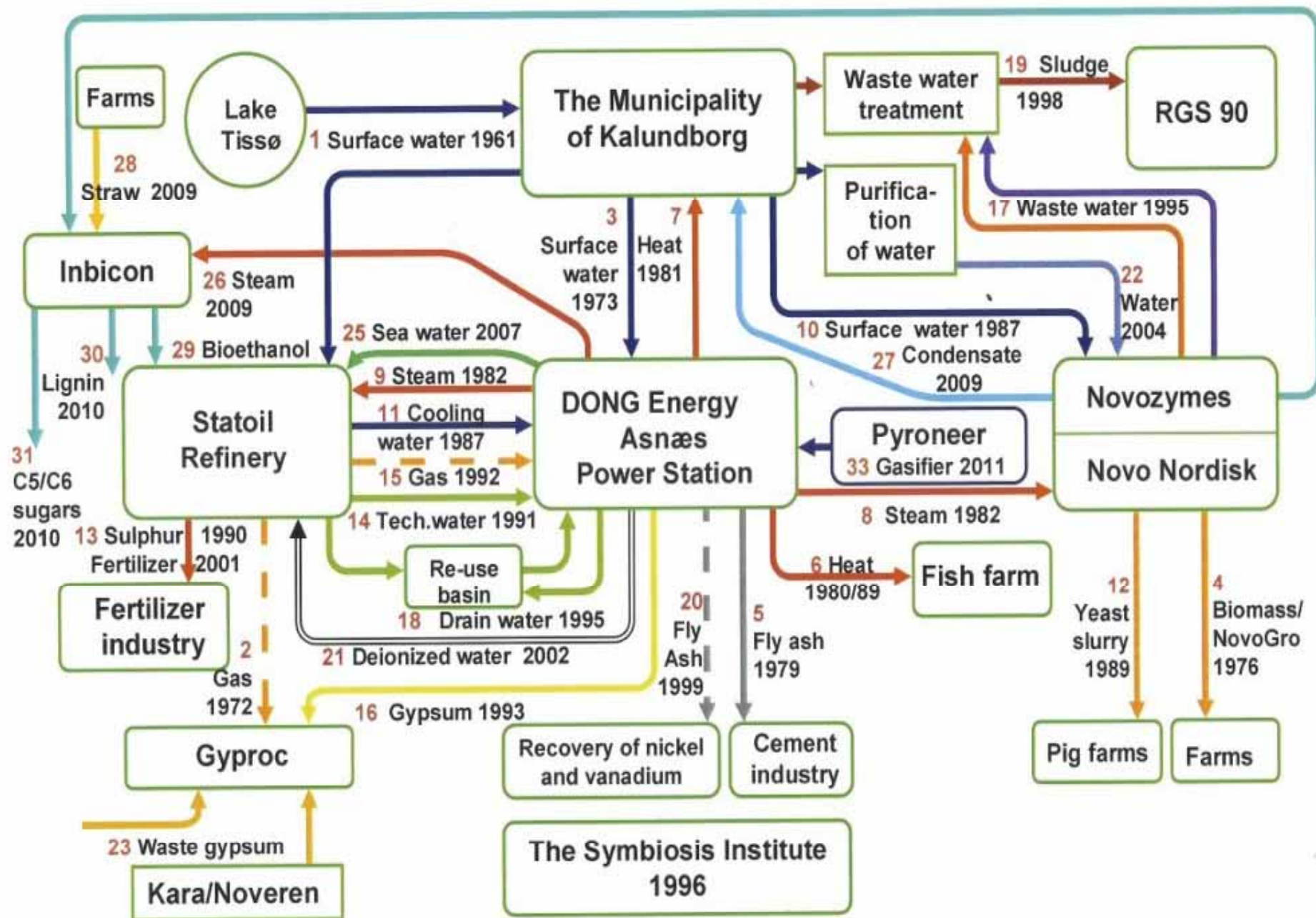
A GIANT FOOTPRINT

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
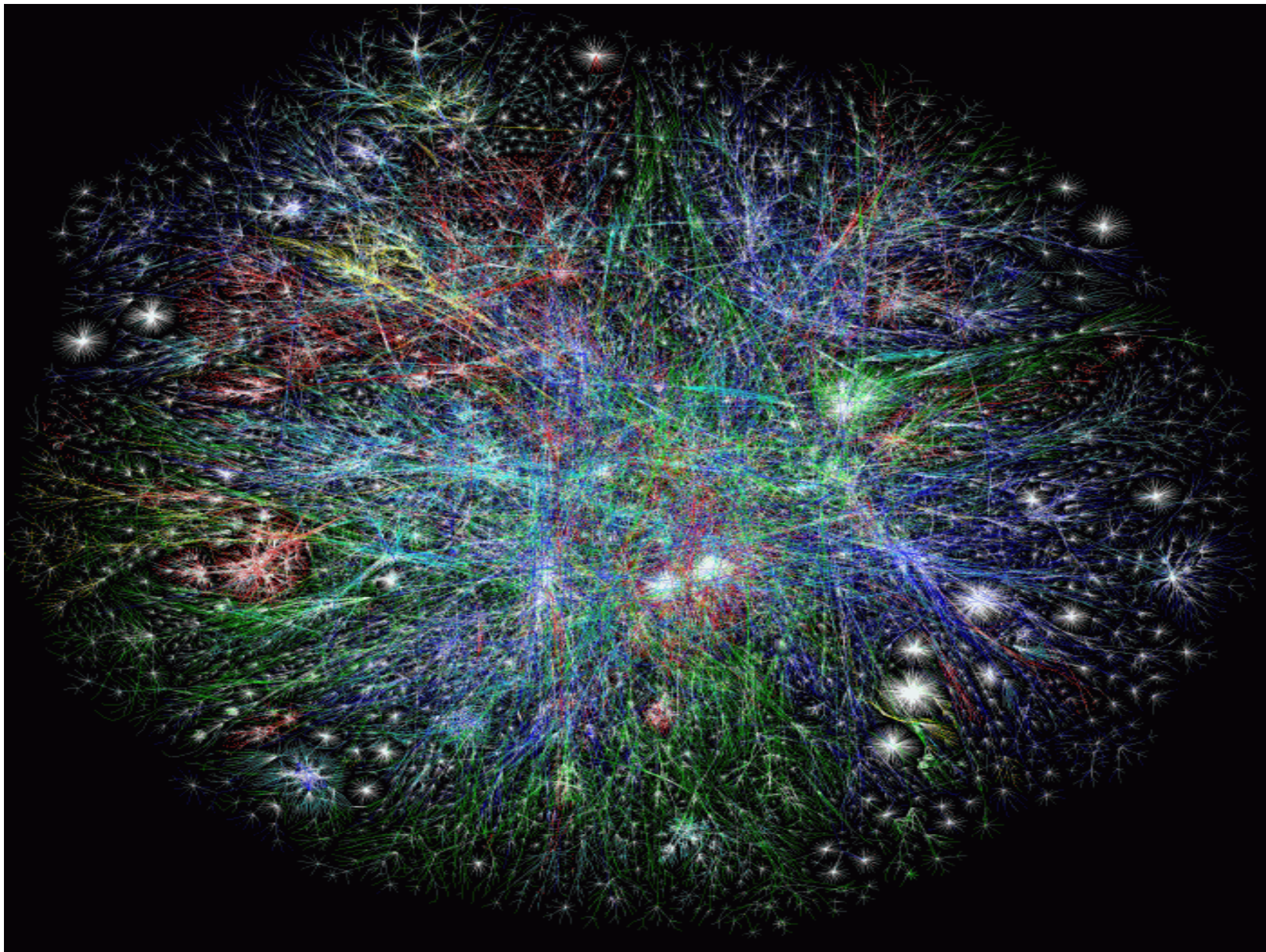
A NIMBLE FOOTPRINT

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 assure reabsorption of its limited CO2 output

Herbert Girardet, recent publications

- *Cities, People, Planet – Urban Development and Climate Change,* Wiley, London, 2004 and 2008

  - Renewable Adelaide, 2011
  http://thesolutionsjournal.anu.edu.au/node/1153

  - *A Renewable World – Energy, Ecology, Equality,* Green Books, Dartington, 2009

  - Regenerative Cities, 2011

  - A Future for Gulf Cities, 2012

  all 3 can be downloaded from: www.worldfuturecouncil.org

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