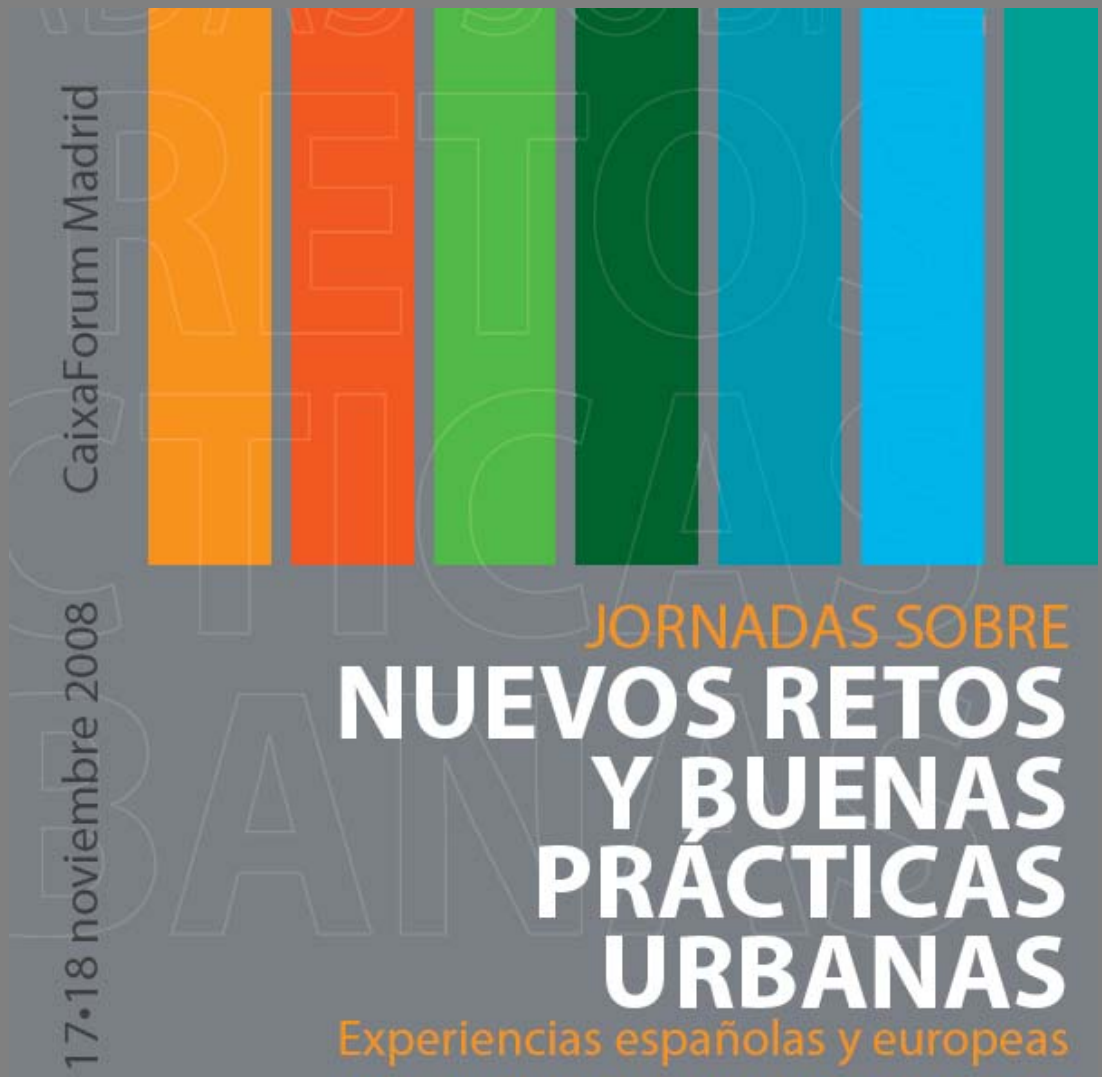


THINK GLOBAL, ACT URBAN.

HERBERT GIRARDET.
WORLD FUTURE COUNCIL.

Think Global, Act Urban

Herbert Girardet

World Future Council

Presentation Outline

1. **Cities before the industrial revolution**
2. **A legacy of fossil fuel dependence**
   - Cities and the climate crisis
3. **Opportunities for change**
   - The renewable energy revolution
   - Transport alternatives
   - Local food supplies
   - Restraining urban sprawl
   - Towards the sustainable city

King Coal

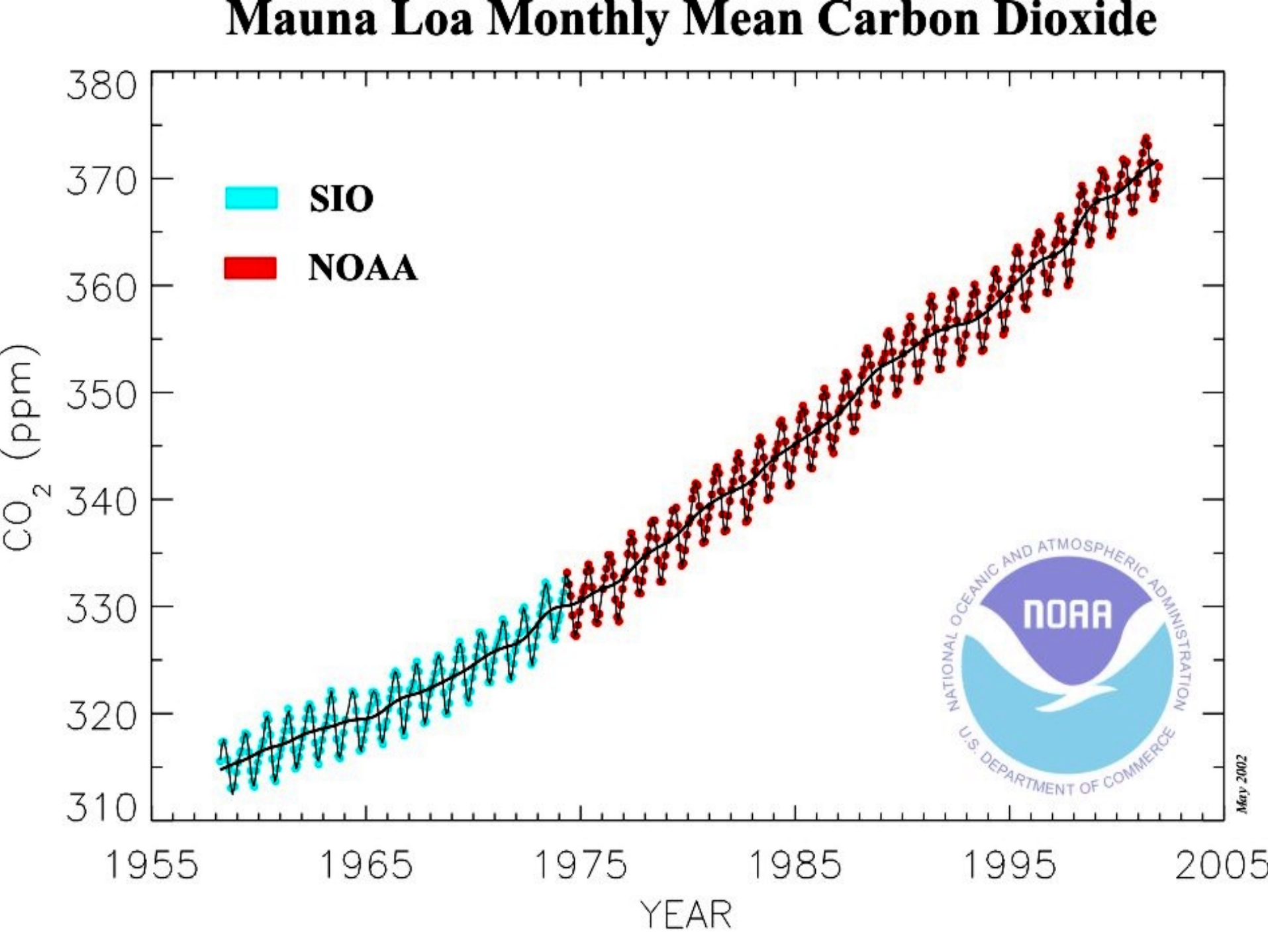
20
25
30

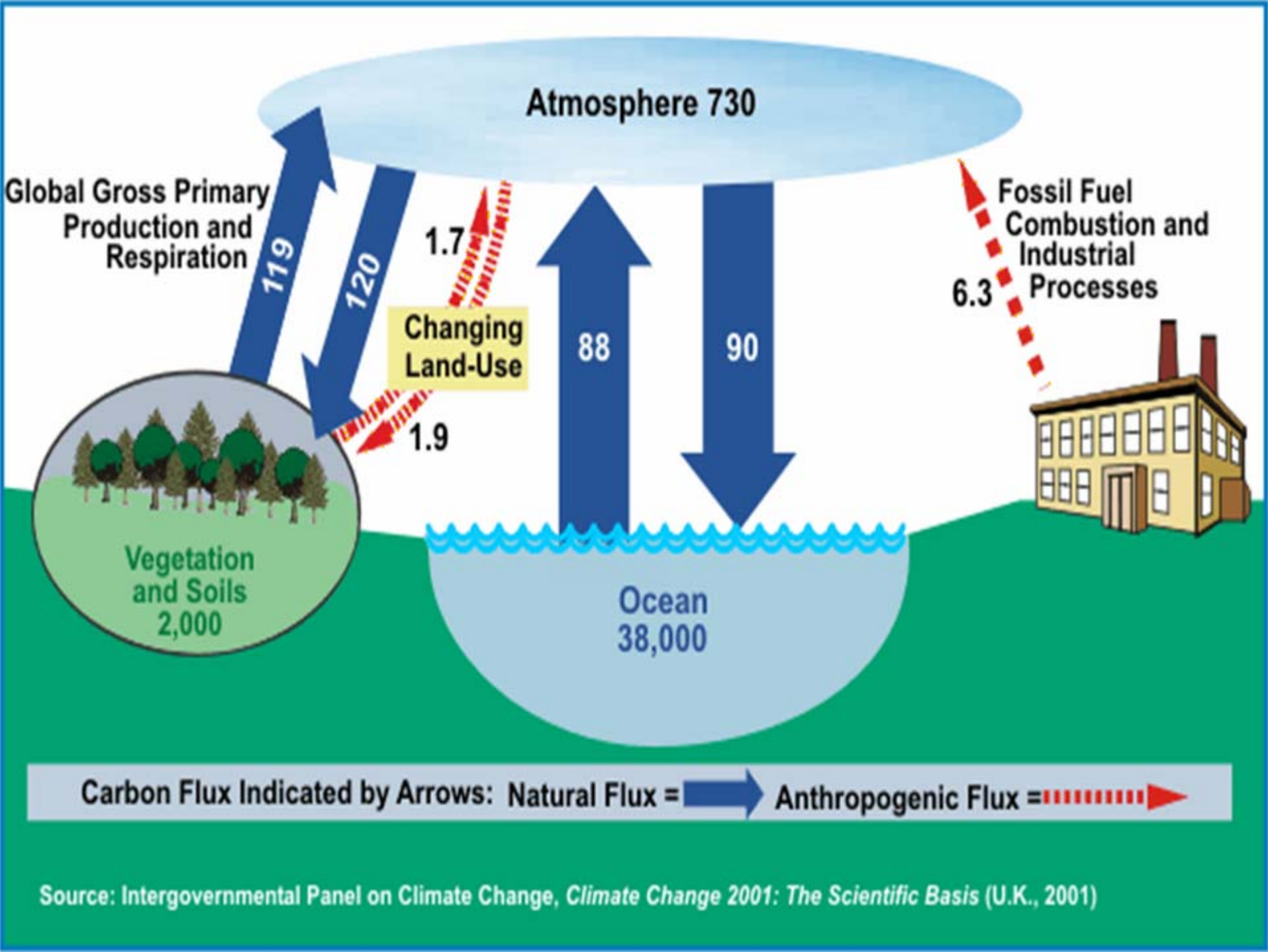
DOCKWISE
BLUE MARLIN

Volga - Dnepr
#7 842220267

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**
- **Every year we burn at least one million year's worth of fossil fuel deposits**
- ***Cities, on 3-4% of the world's land surface use 80% of its resources, and discharge most solid, liquid and gaseous waste***


Mauna Loa Monthly Mean Carbon Dioxide
SIO
NOAA
380
370
360
350
340
330
320
310
CO2 (ppm)
1955
1965
1975
1985
1995
2005
YEAR
NOAA
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
U.S. DEPARTMENT OF COMMERCE
May 2002



Source: Intergovernmental Panel on Climate Change, *Climate Change 2001: The Scientific Basis* (U.K., 2001)

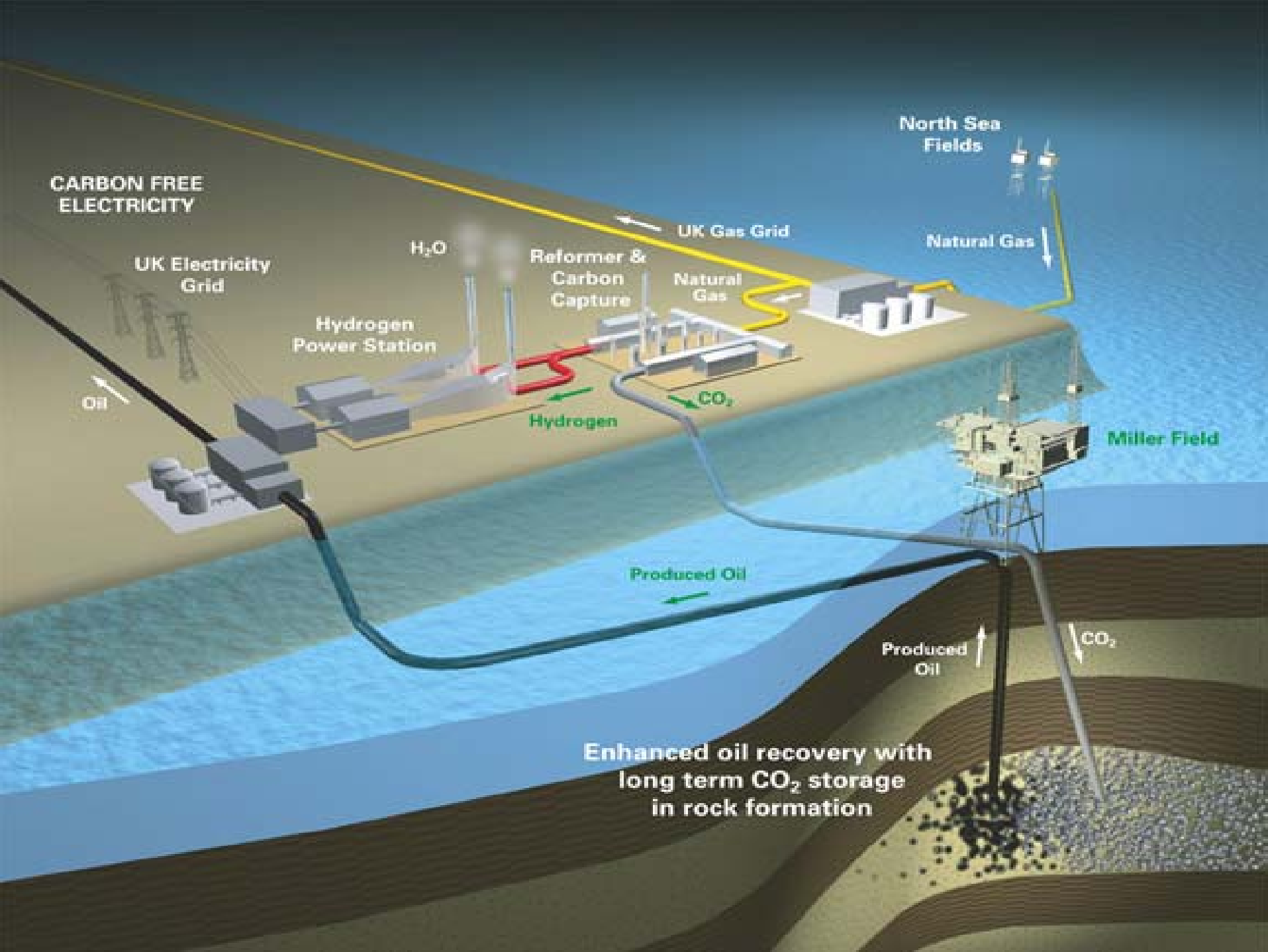
Dynamics of change

Increasing

- Energy demand
- Energy costs
- CO2 emissions
- Climate instability
- Sea levels

Decreasing

- Fossil fuel reserves
- Natural resources
- Time left for action
- *Cost of renewable energy*

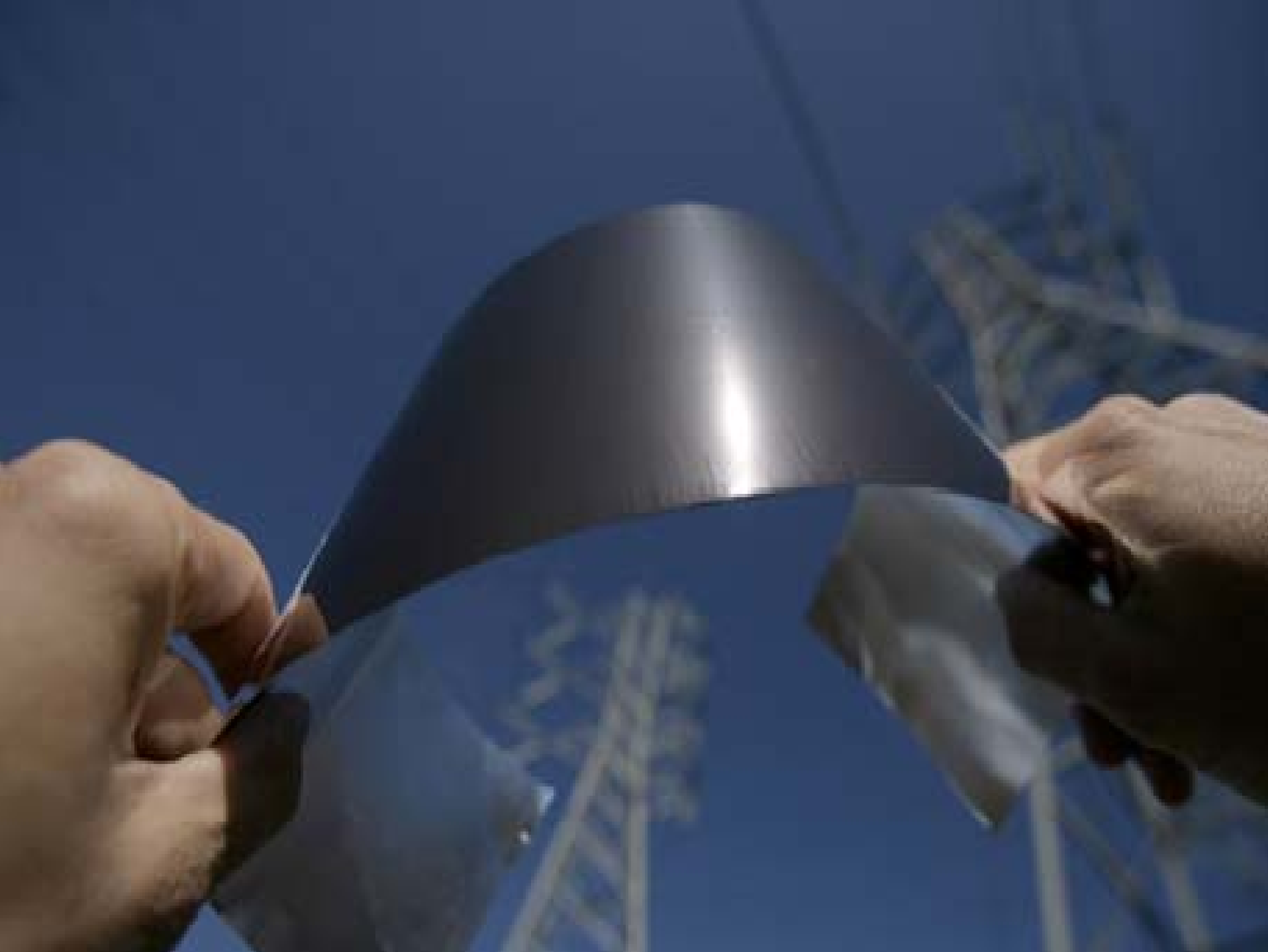

CARBON FREE ELECTRICITY
UK Electricity Grid
Oil
Hydrogen Power Station
H_2O
Reformer & Carbon Capture
UK Gas Grid
Natural Gas
North Sea Fields
Natural Gas
Hydrogen
CO_2
Miller Field
Produced Oil
Produced Oil
CO_2
Enhanced oil recovery with long term CO_2 storage in rock formation

Living on the sun

J05 12 2

Germany‘s Feed-In Tariffs, 1999 to 2007

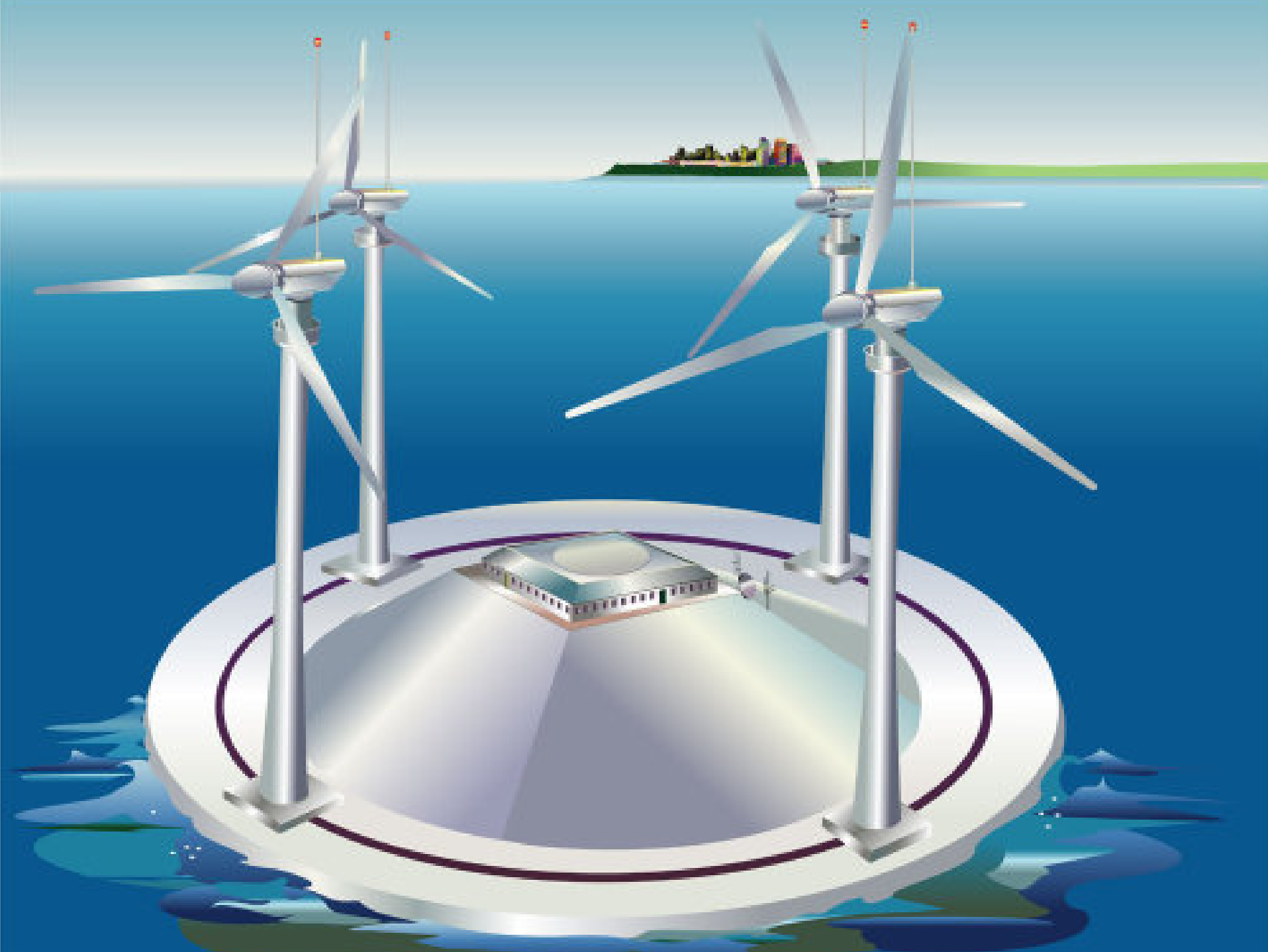
- 2006: 250,000 jobs created, €21.6bn turnover for RE companies, €8.7billion investment per year
- €4,5 billion saving per year due to reduced fuel imports
- 97 million tonnes of CO2 saved
- Eco-benefit: €5.40 less environmental damage per household/ month
- Total cost: €1.20 per household/ month
- 2008: 15% share of electricity consumption
- At current growth rates renewables will provide 40% of electricity by 2020, or 100% by 2050

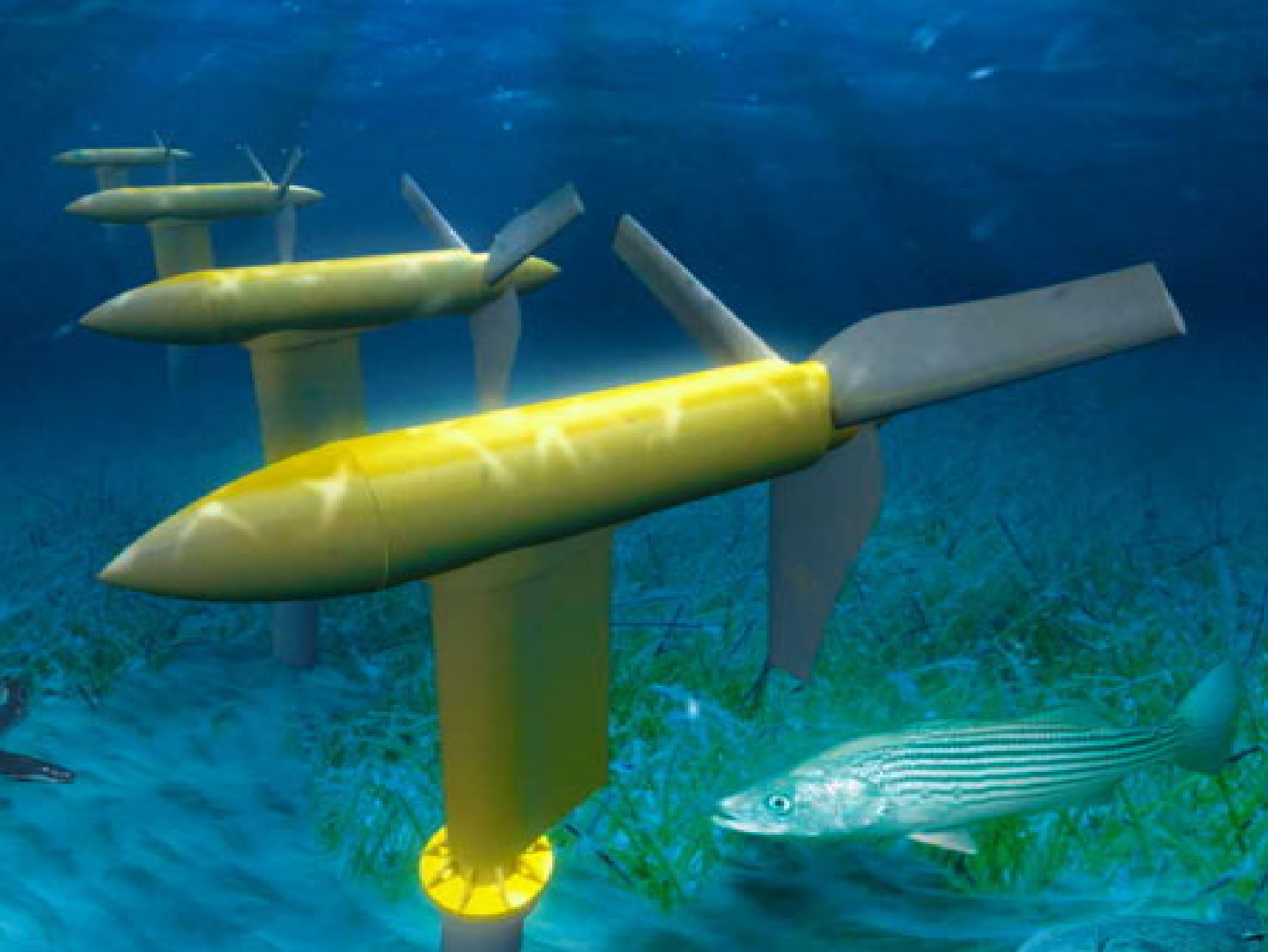


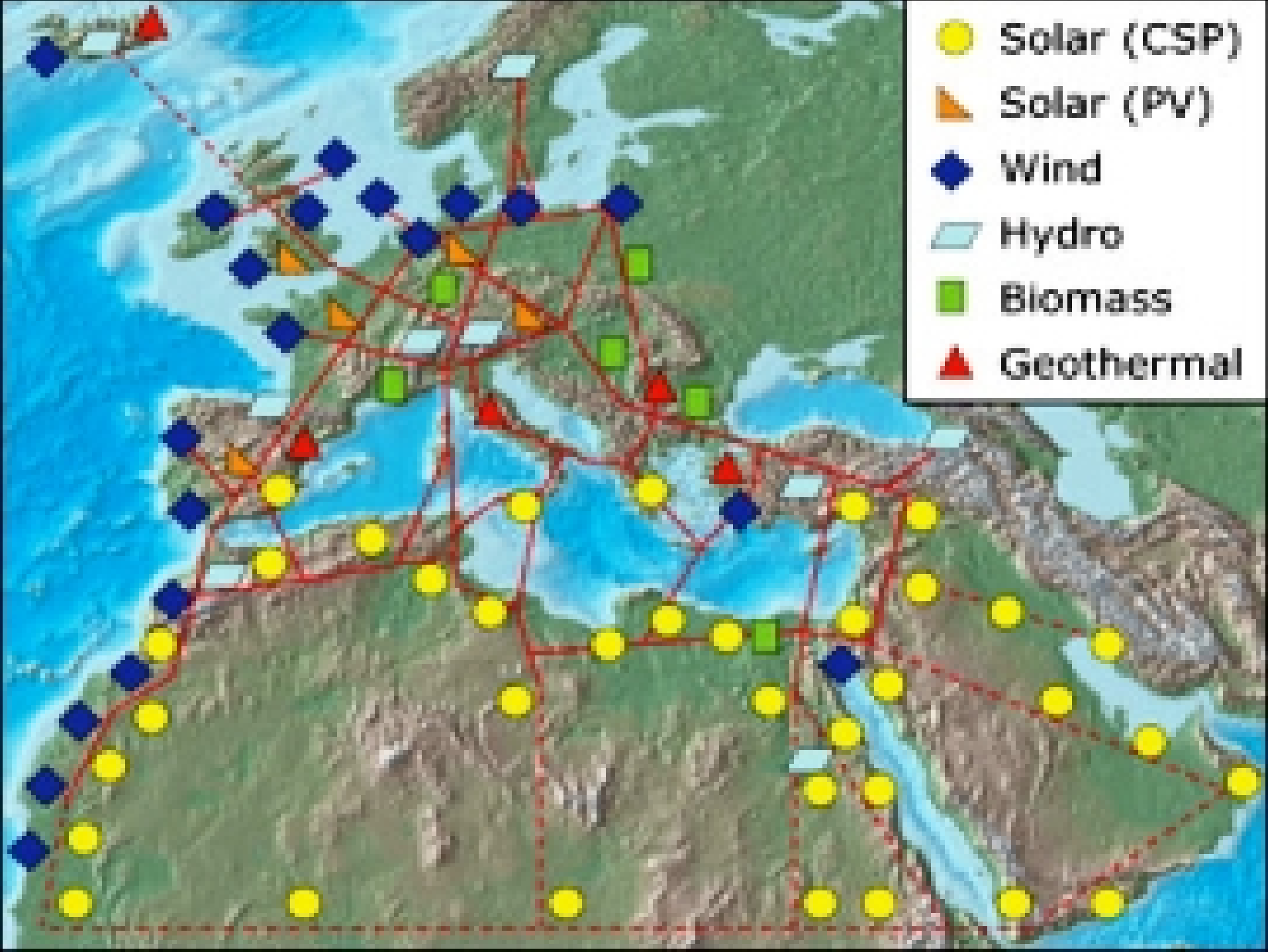
Renewable energy for cities

- The earth's *solar income* is 15,000 greater than our annual energy consumption
- Per surface area, *solar technology* can produce up to 200 times more energy than *photo-synthesis*
- Intra-urban: solar thermal, PV and Combined heat-and-power, plus energy efficiency
- Suburban: turning the suburb into a solar power station
- Ex-urban: Large scale solar (plus on- and off-shore windfarms)
- Dealing with intermittency by use innovative technologies

E-112





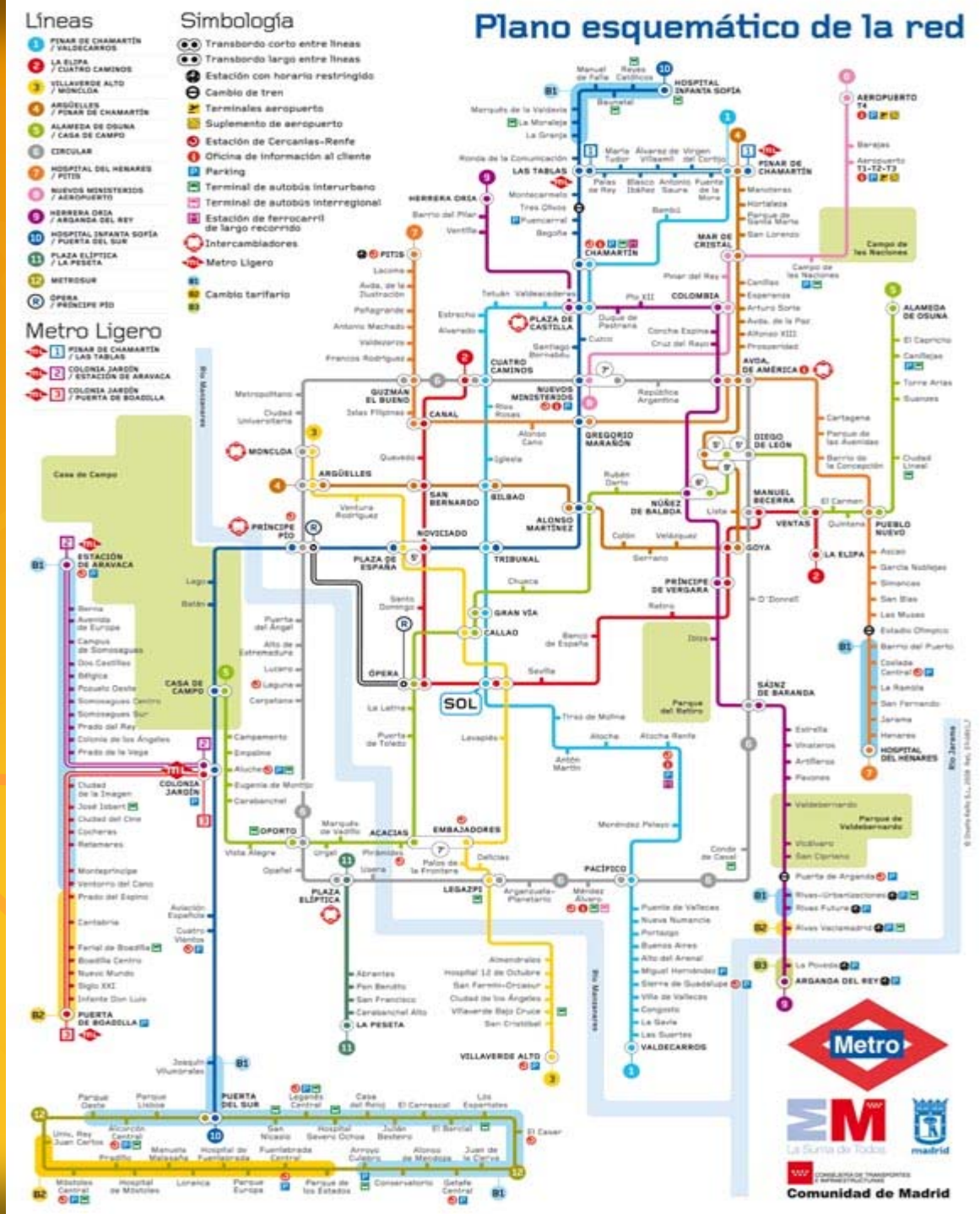

Solar (CSP)
Solar (PV)
Wind
Hydro
Biomass
Geothermal

Sustainable transport

California
6ALZ263
TOYOTA
PRIUS
SolarCity
Solar Power Systems for
Your Home and Business.
solarcity.com
Call 888.765.2489

ELECTRIC DRIVE

Plano esquemático de la red



40 PORTAL 80
TransMilenio

RIE ANCIENNE

WAY

bicing
bicing
1307
794

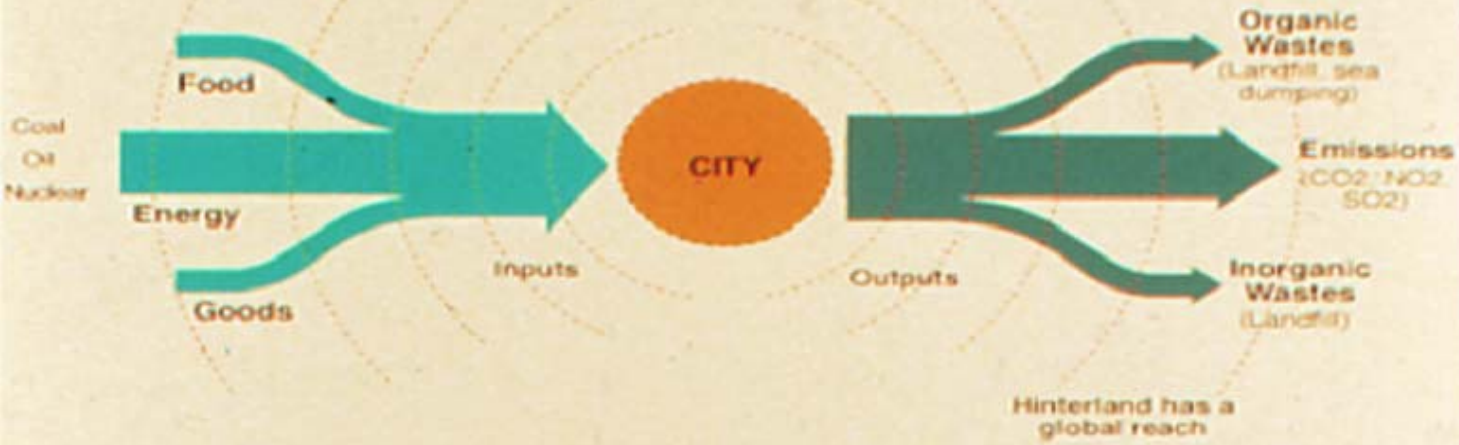
Transport alternatives

- The imperative of low carbon transport
- The potential of the ‘solar suburb’
- The huge potential of hybrid technology
- The importance of compact urban form
- Localisation and interconnection
- New emphasis on cycling and pedestrian living

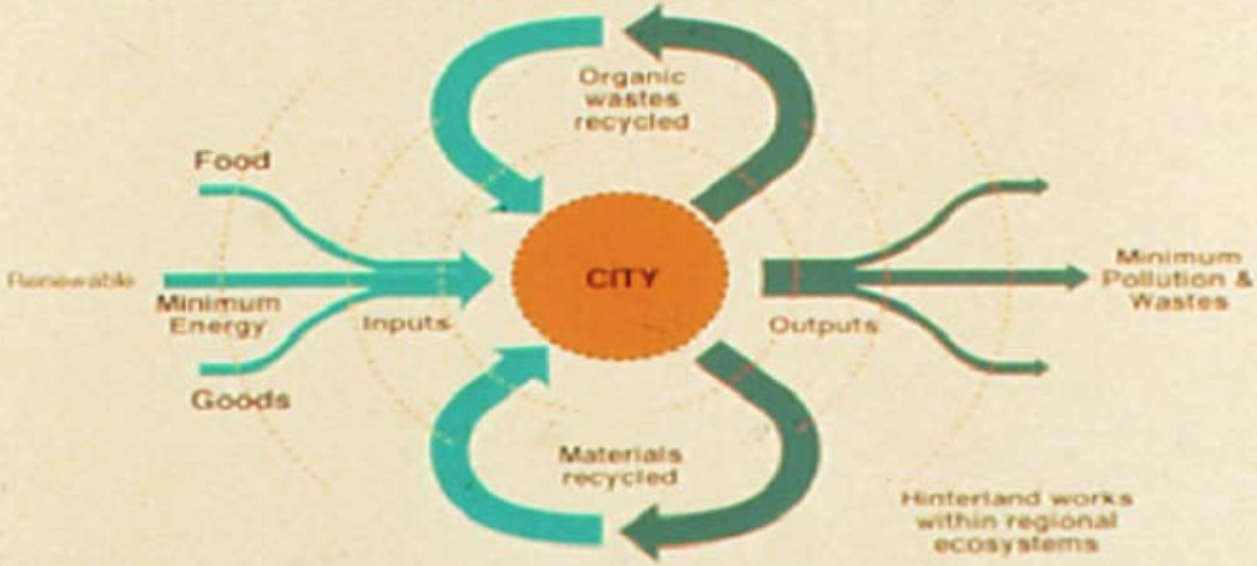
Feeding the city

SQUASH

Linear Metabolism cities consume resources and create waste and pollution at a high rate



Circular Metabolism cities reduce consumption and pollution, recycle and maximise renewables

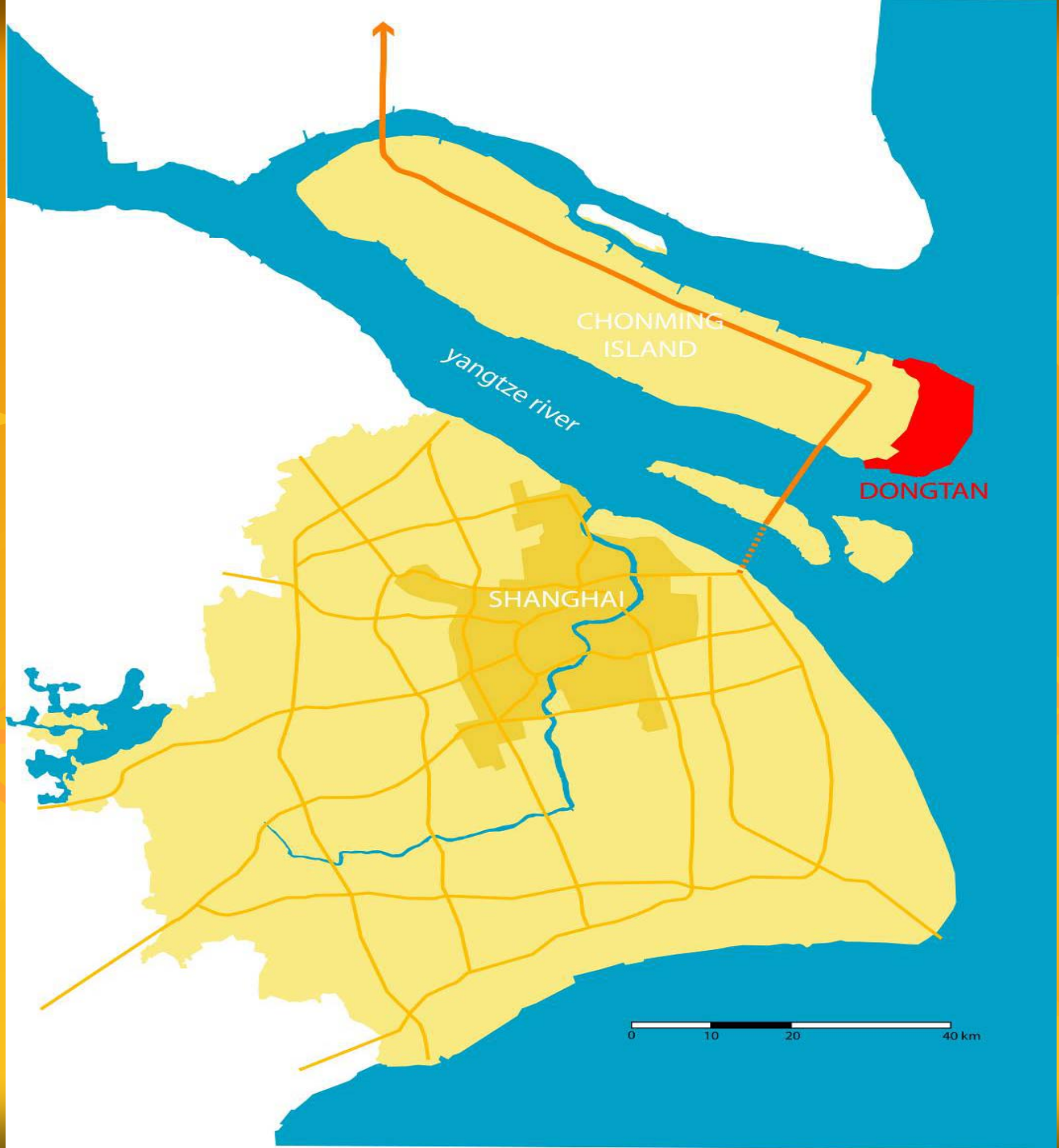


Sustainable food

- Our current food system requires 10 to 20 times as much energy as the food contains
- In the US, 20% of total energy goes into food production and distribution
- Reducing *food miles* to enhance energy efficiency of food supply and food security
- Involving more people in the food system
- Returning nutrients and organic matter back to the land

Dongtan Ecocity

AURORA


CHONMING
ISLAND
yangtze river
DONGTAN
SHANGHAI
0
10
20
40 km

eco farming demonstration
wind turbines
bird park / large scale visitor attraction
future dongtan phases main nodes
future dongtan phases secondary nodes
other nodes
zero emmissions road access
waterbus
interchange to/from shanghai
New bridge to Shanghai
eco farms
eco farms
eco farms
eco farms
wetland park
ramsar
ramsar
bird watching
eco park
golf course
national hotel
energy centre
eco park
horse riding
ferry port to/from shanghai and pudong
0m
300m
1500m
3000m

The ‘Dongtan Principles’

- Small ecological footprint
- Compact urban development
- Renewable energy supply
- Zero emission transport / low traffic noise
- Waste water recycling
- ‘Circular metabolism’
- Biodiversity in landscape design
- A city embedded in farmland

COM A RECICLAGEM CURITIBA SALVOU
4072180
ÁRVORES
SE TODAS AS CIDADES DO BRASIL
SEGUISSEM ESTE EXEMPLO:
8149368 6
LIXO QUE NÃO É LIXO
50 Kg DE PAPEL
= 1 ÁRVORE
CURITIBA
PREFEITURA MUNICIPAL

A giant footprint
The city below 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
● Its cars emit vast amounts of CO_2, requiring vast areas of vegetation to reabsorb it
A nimble footprint
The city above takes another stance:
● Its citizens limit their meat consumption, preferring vegetable foods
● Timber and paper are used frugally and efficiently
● Tree planting schemes assure reabsorption of its limited CO_2 output

Global shared learning

- Global information exchange on sustainable urban development:
- building codes, land use and transport policies and resource management
- Renewable energy: Feed-In Tariffs - cost effective investment new technology
- Complementary policies to stimulate dramatic increases in energy efficiency

Herbert Girardet, books:
- Cities, People, Planet – Urban Development and Climate Change, 2004 and 2008

- Surviving the Century – facing climate chaos and other global challenges, 2007

www.worldfuturecouncil.org