International Institute for Applied Systems Analysis
IIASA www.iiasa.ac.at

science for global insight

Climate change and climate compatible development: can *a threat* become *an opportunity?*

Pavel Kabat,

Director General & CEO, IIASA

Professor, Earth System Science, Wageningen, NL

THE EARLY 1970s

Sources: nuclearweaponarchive.org, The Guardian

science for global

IIASA, International Institute for Applied Systems Analysis

Sources: US Department of Interior, IIASA

23 MEMBER COUNTRIES (NMOs)

International Institute for Applied Systems Analysis








- International, independent, interdisciplinary
- Research on major global problems
- Solution oriented, integrated systems analysis








International Institute for Applied Systems Analysis
IIASA www.iiasa.ac.at

science for global insight

23 MEMBER COUNTRIES

Representing:

71% of the world's economy

US$54,797,000 million from World GDP of US$77,302,000 million

(including 8 of the world's 10 largest economies)

63% of the world's population

4,599.7 million people from World population of 7,247.9 million

Sources: GDP figures from IMF (2014); population figures from IIASA (2015)

International Institute for Applied Systems Analysis

science for global insight

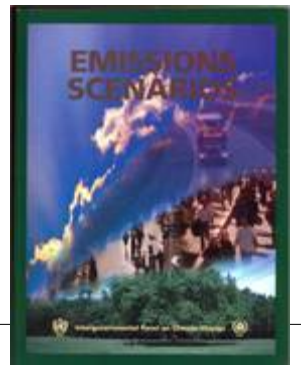
IIASA TRULY INTERNATIONAL

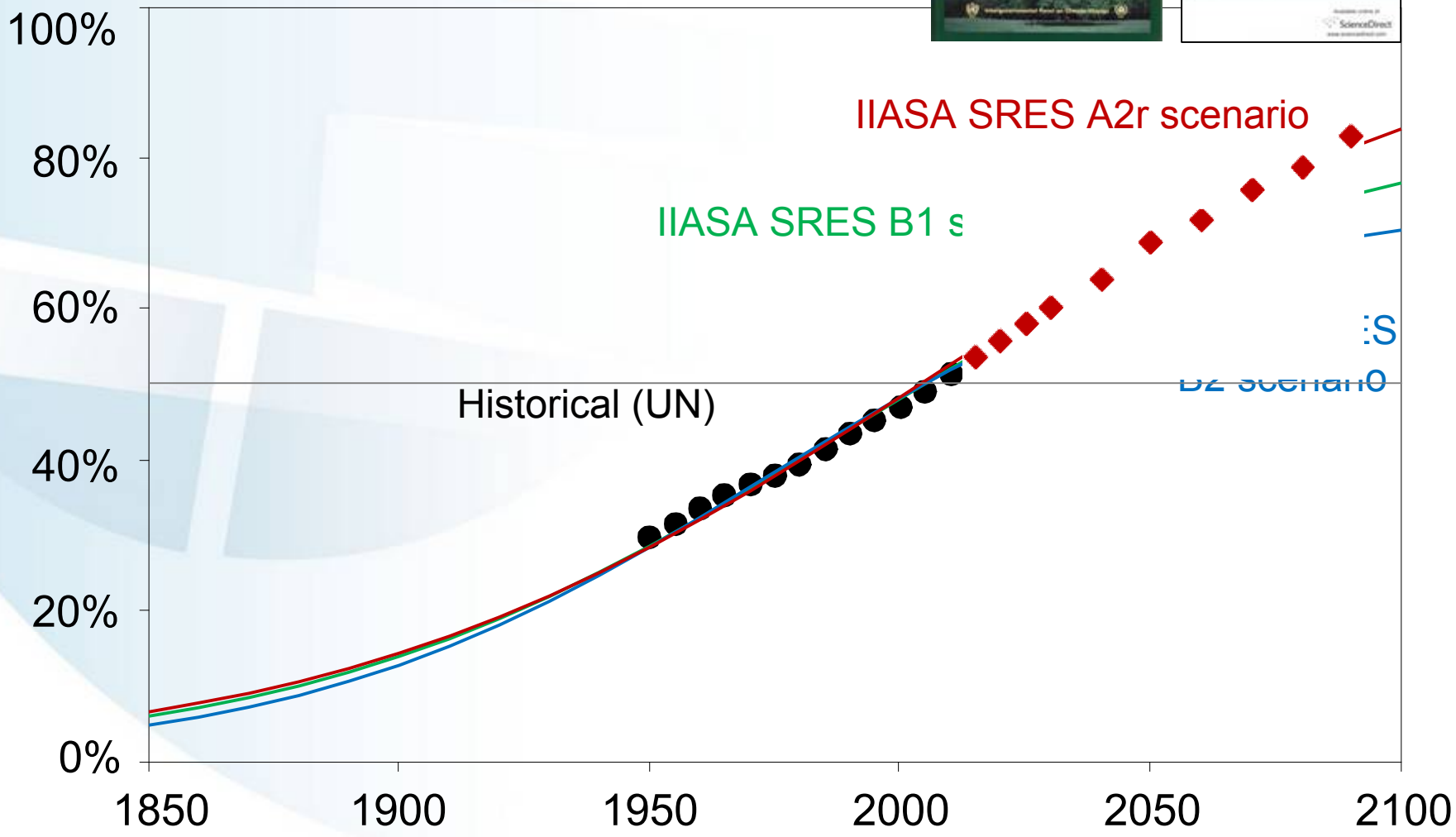
- 1,445 visitors & collaborators in 2014
- Plus ~25% of IIASA alumni (3,505 people worldwide) remain actively involved in IIASA research
- Plus ~600 partner institutions
- In sum, ~2500 researchers from some 65 countries involved in IIASA's research network (external faculty)
- And it is not just research networks: IIASA researchers took part in 112 advisory boards and steering committees in 2014

Major Global Challenges

- The industrial revolution led to unprecedented levels of affluence and production, but also inequity;
- The unintended consequences demonstrate significant impacts on our social and natural environments transcending planetary boundaries.
- Overcoming formidable global challenges requires scientific foundations for understanding, formulating effective response strategies and the multi-lateral cooperation for action plans forward.

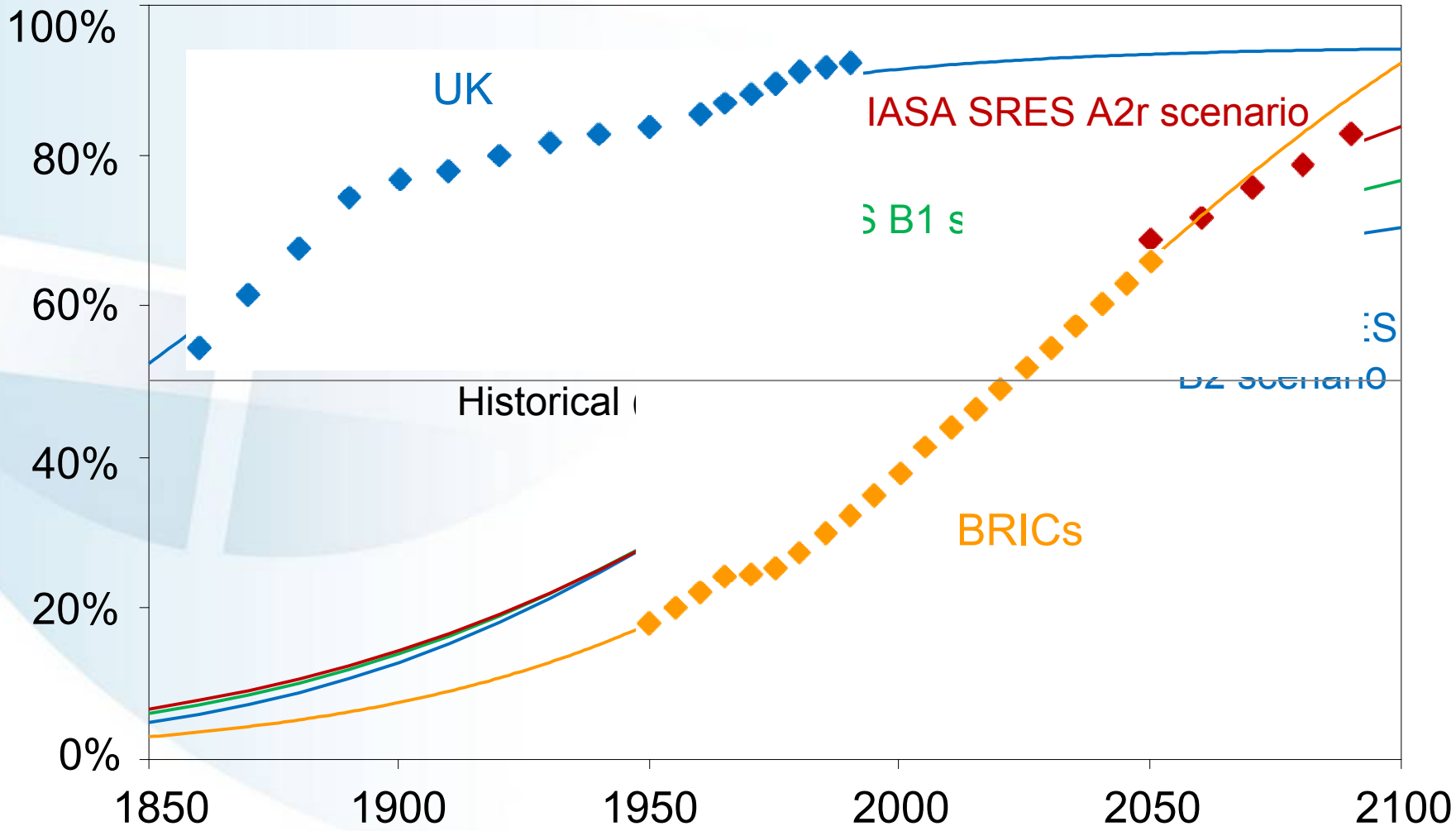
Urbanization World





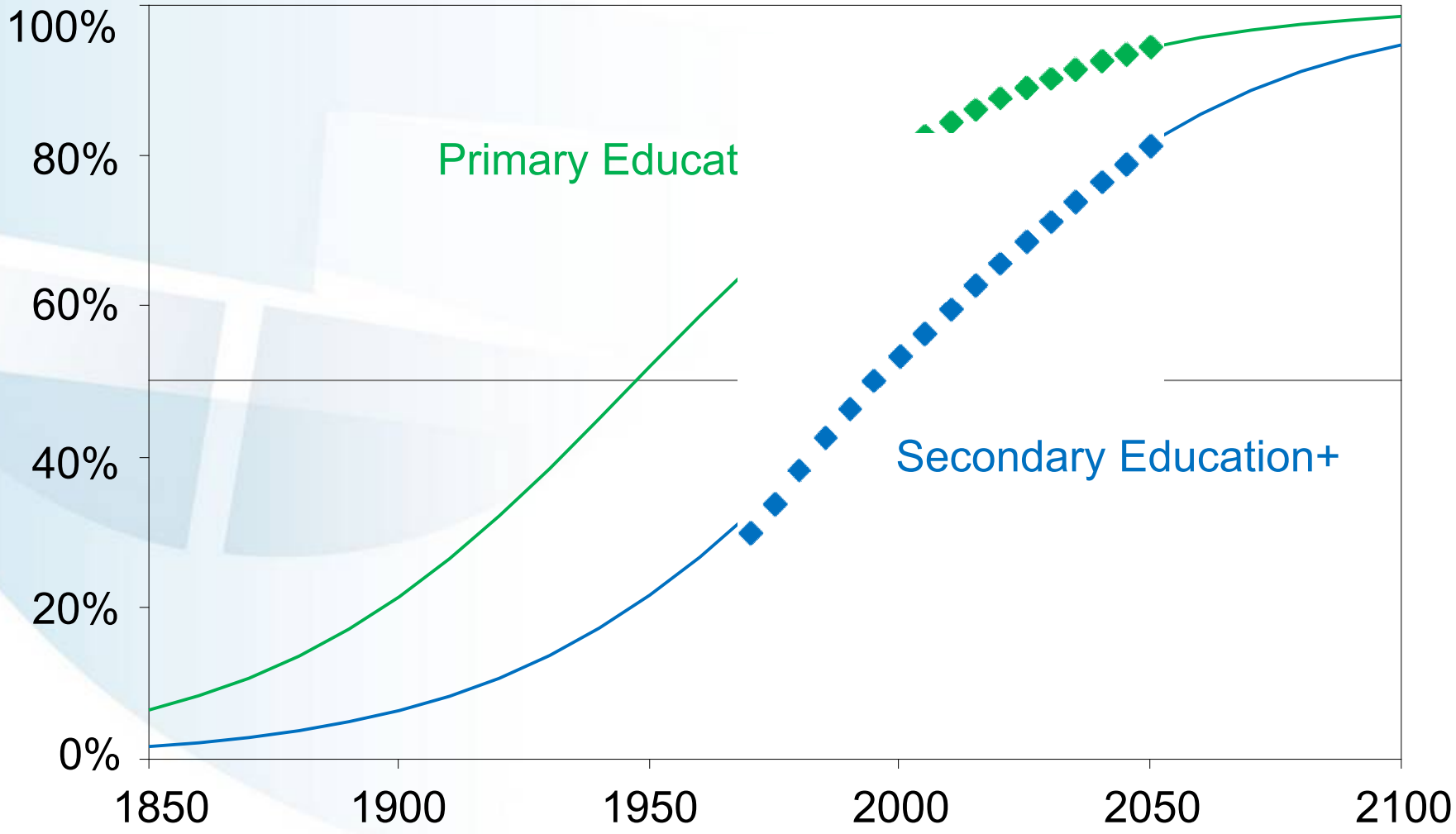
Source: Grubler, 2007

Urbanization
World, UK, BRICs



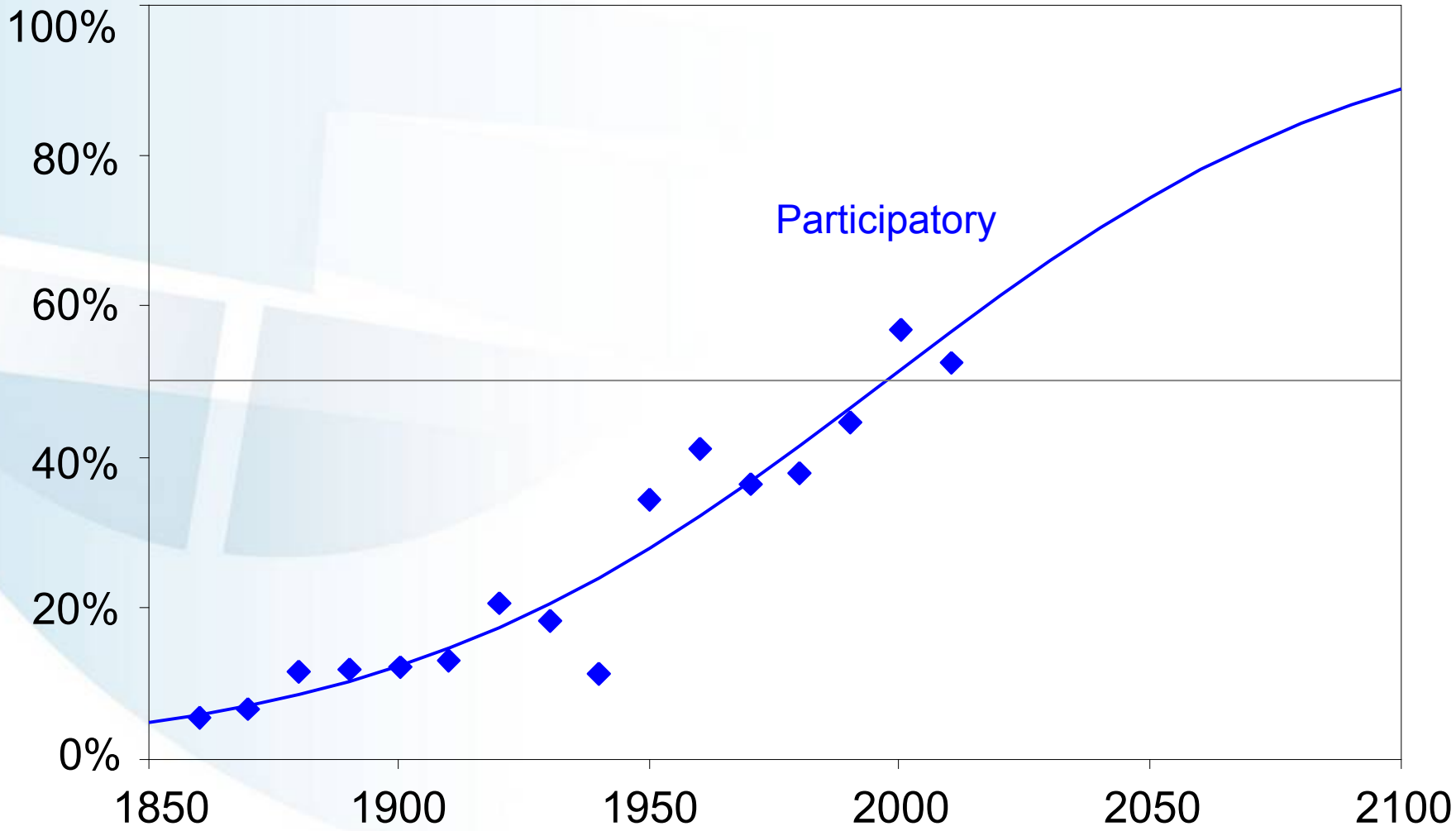
Source: Grubler, 2007

Global Educational Attainment



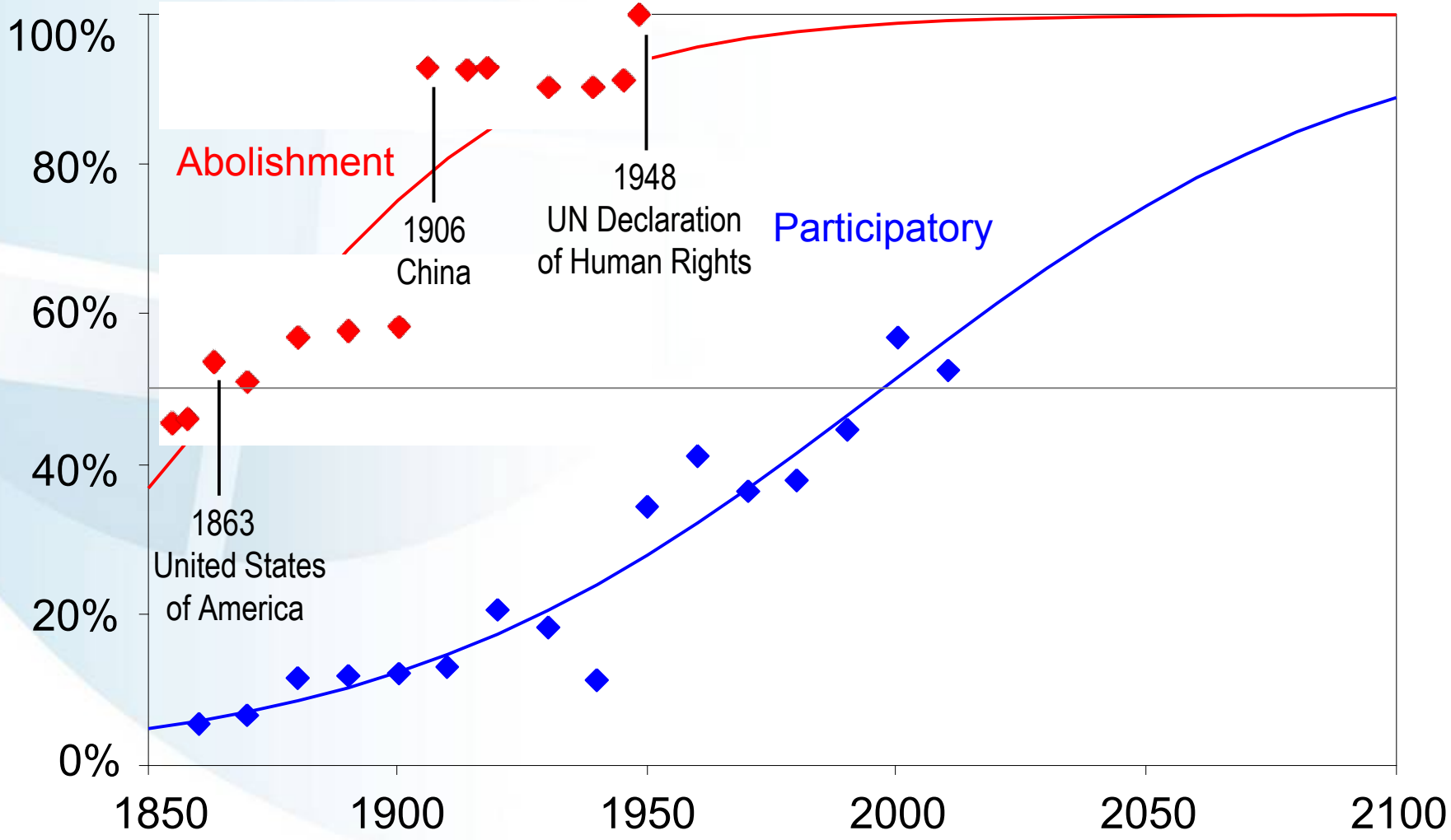
Source: Lutz et al. (2007)

Diffusion of Democracy



Source: Modelski & Perry, 2002; 2010

Diffusion of Democracy
Slavery Abolishment

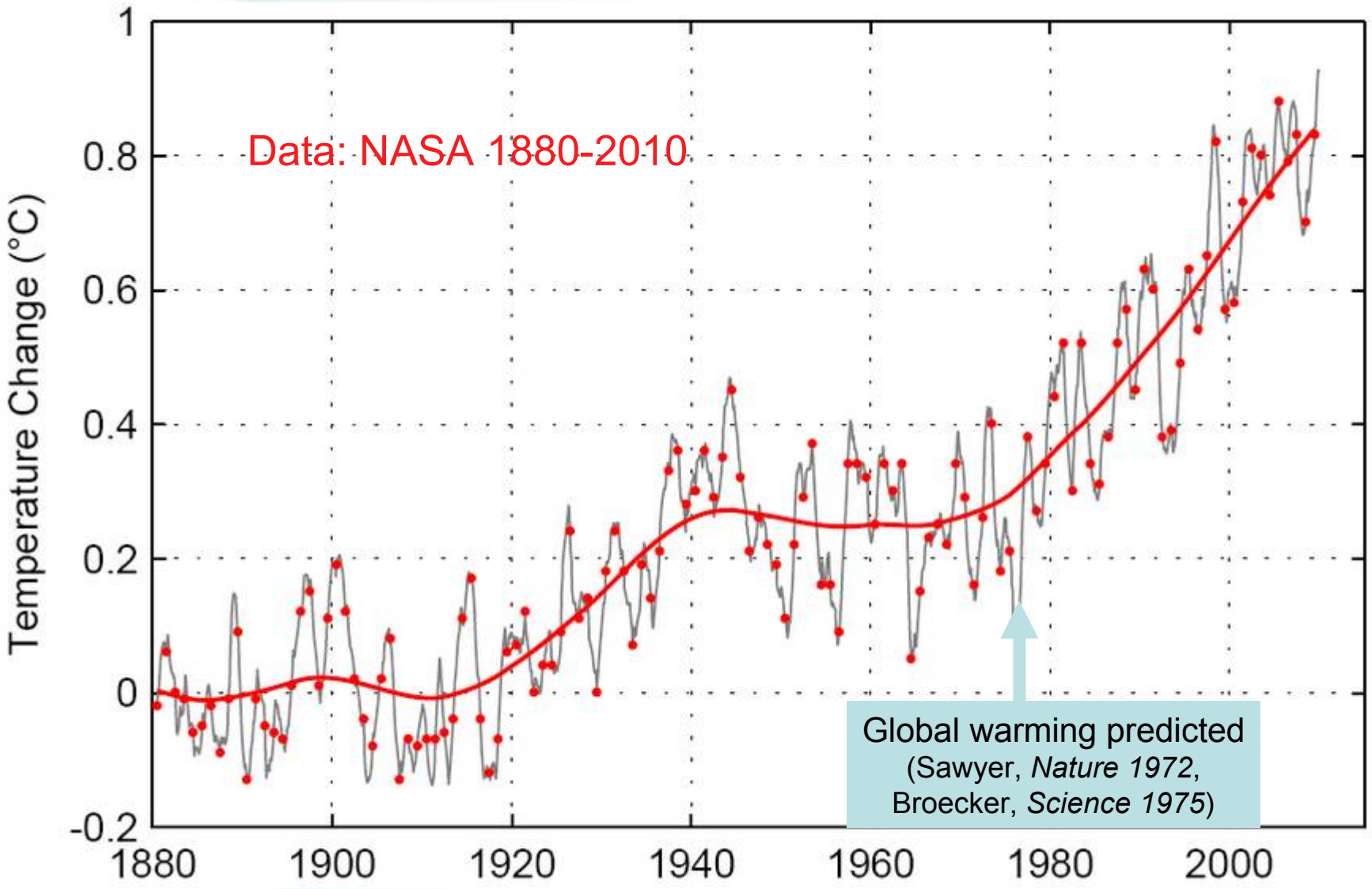


Source: Naki & Rogner, 2012; Modelski & Perry, 2002; 2010

Food for a Week, Displaced Family, Chad

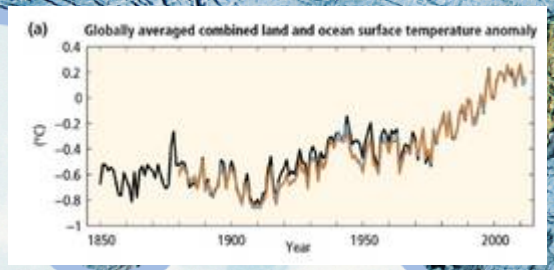
Food for a Week, European Family

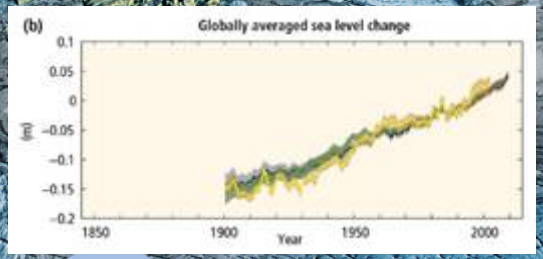
Earth is Warming

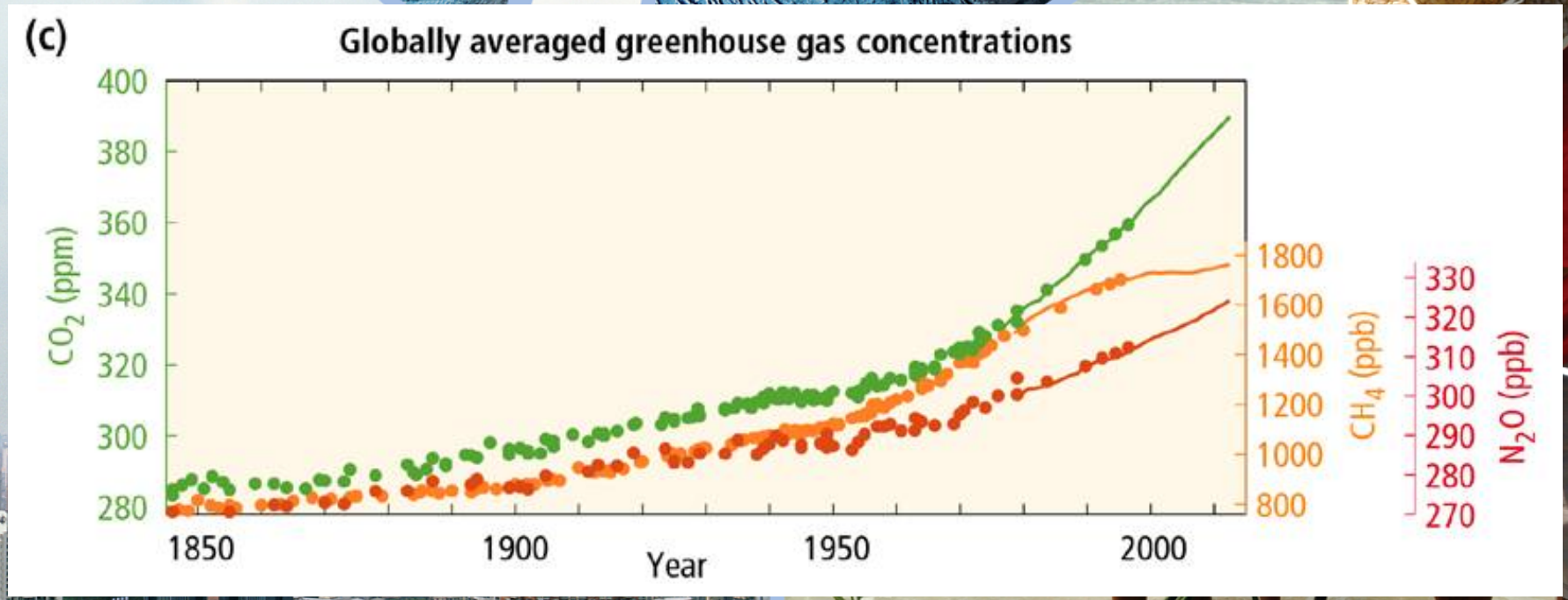


IPCC Fifth Assessment Report
Synthesis Report

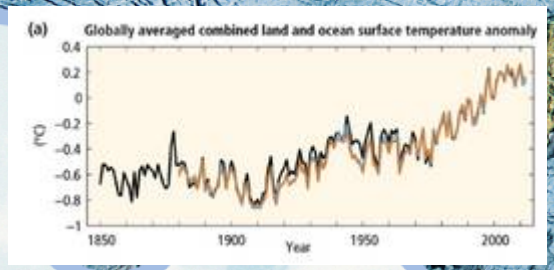
ipcc
INTERGOVERNMENTAL PANEL ON climate change
WMO UNEP

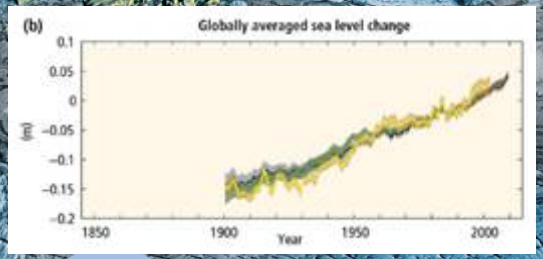


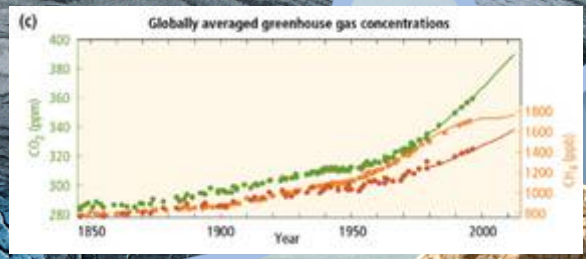


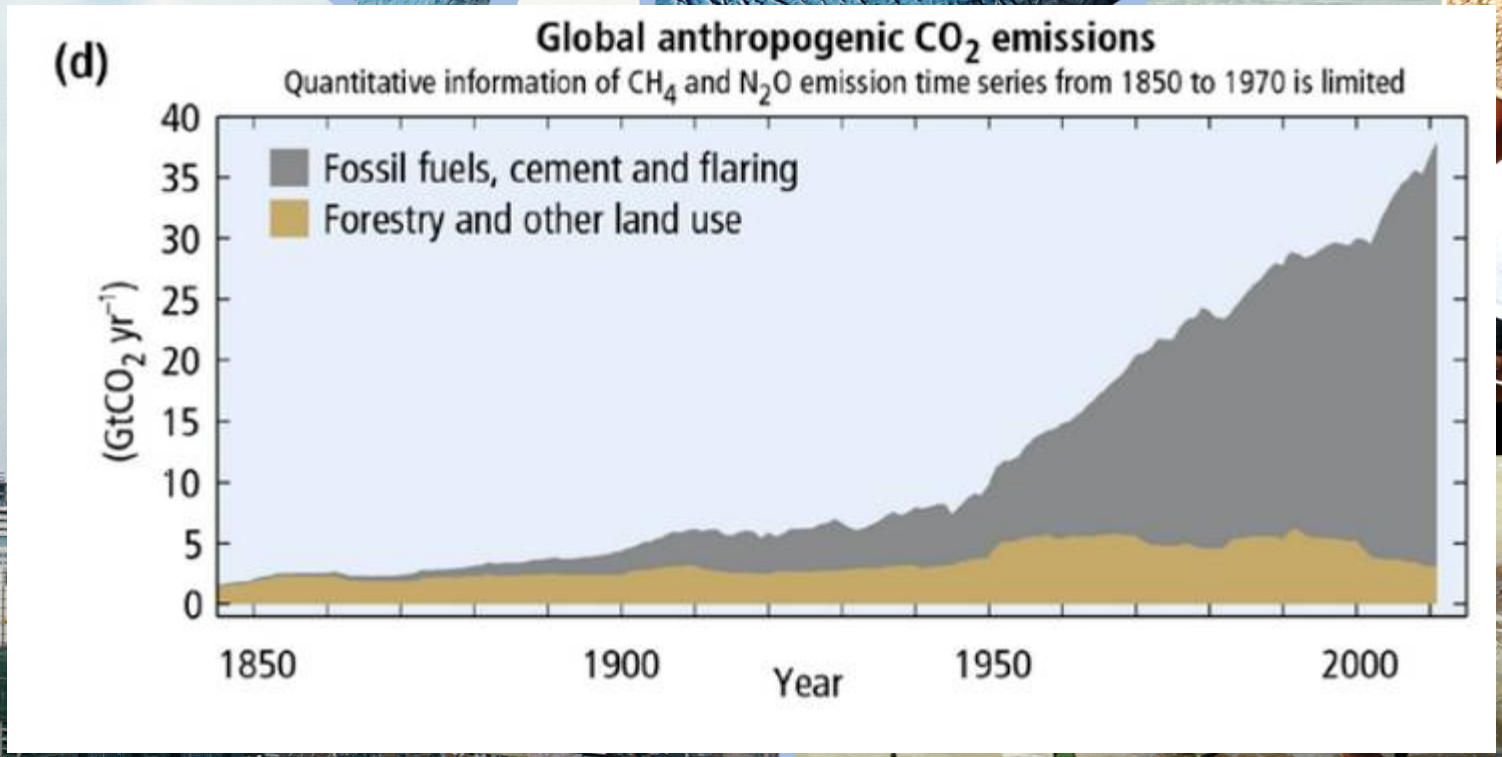


IIASA, International Institute for Applied Systems Analysis
INTERGOVERNMENTAL PANEL ON climate change
WMO UNEP









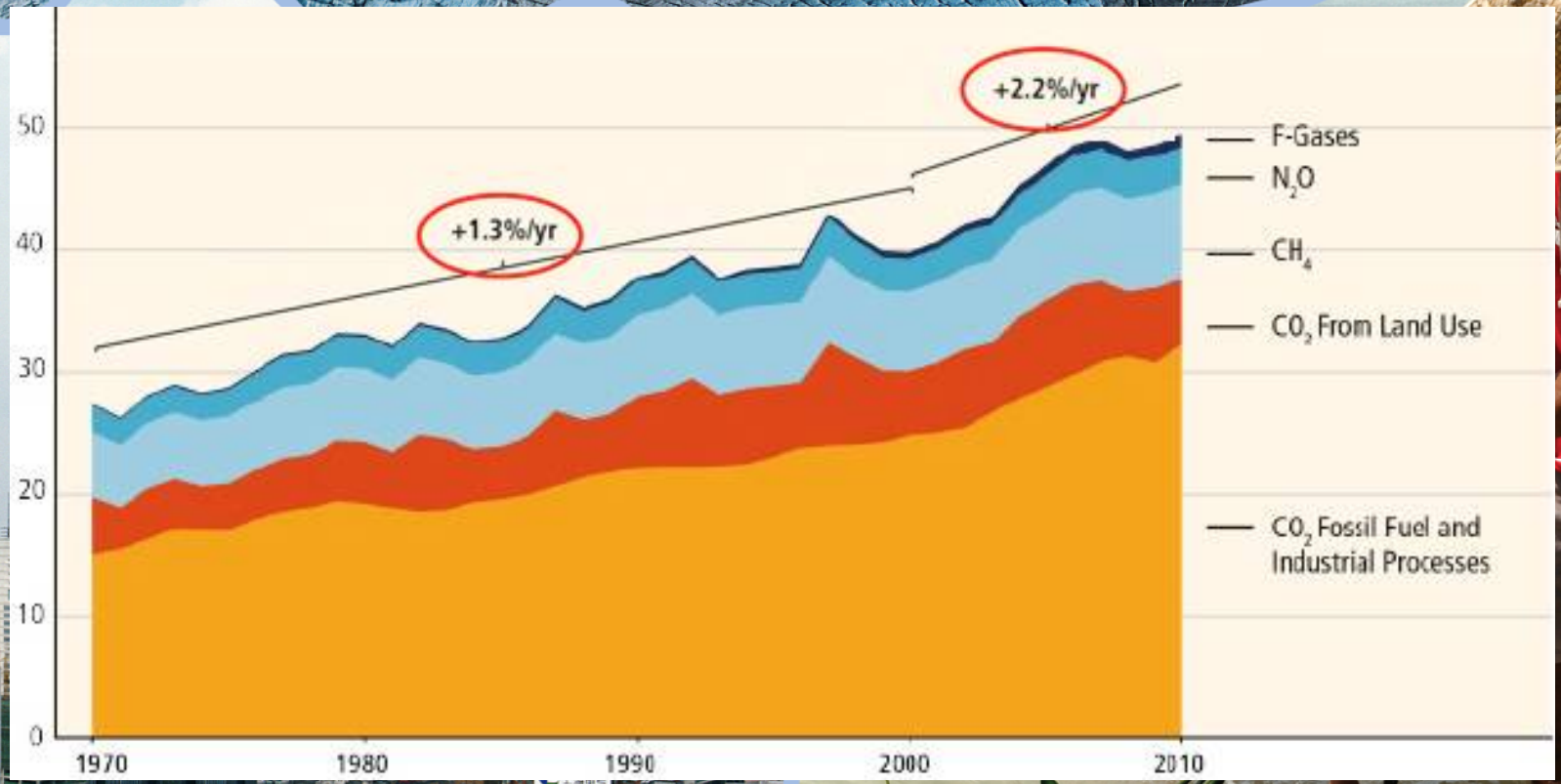
AR5 SYR SPM

IIASA, International Institute for Applied Systems Analysis

INTERGOVERNMENTAL PANEL ON climate change

WMO UNEP

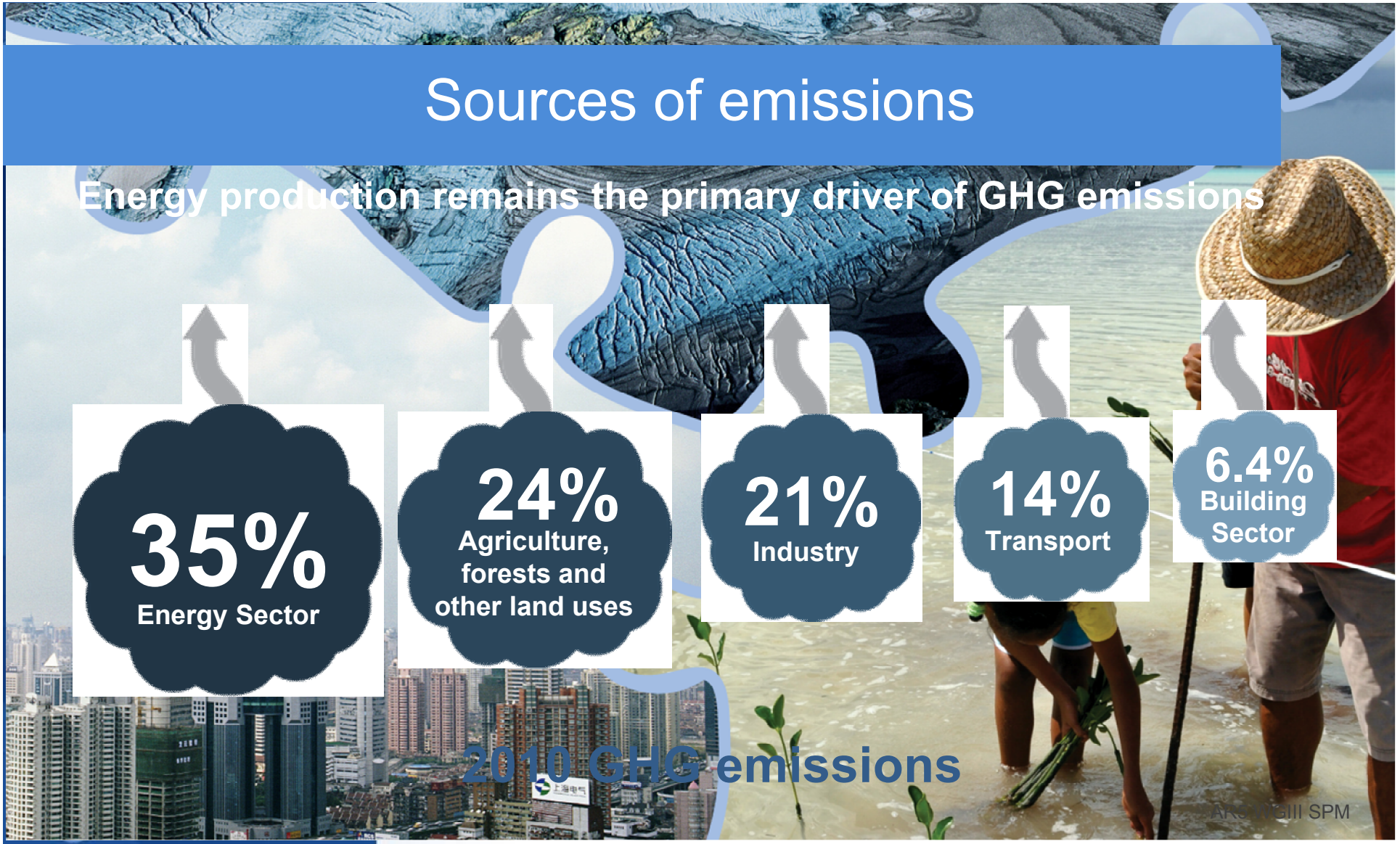
GHG emissions growth between 2000 and 2010 has been larger than in the previous three decades



AR5 WGIII SPM

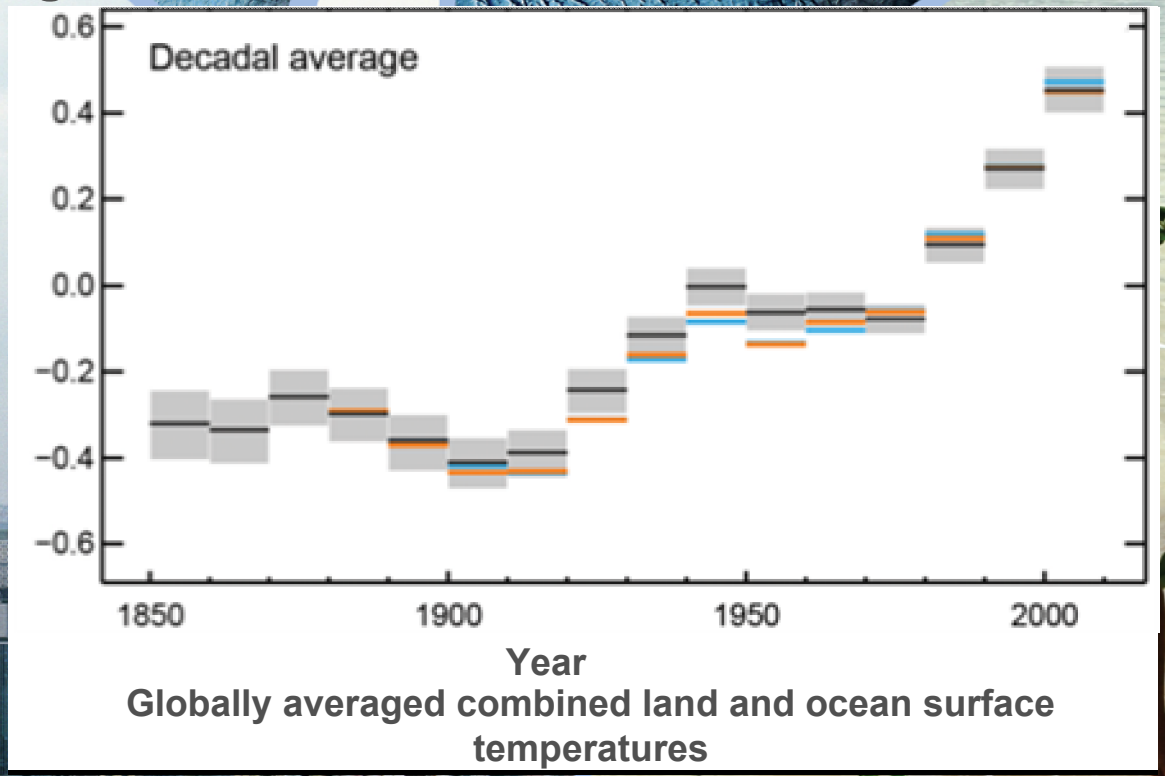
Sources of emissions

Energy production remains the primary driver of GHG emissions



Temperatures continue to rise

Each of the past 3 decades has been successively warmer than the preceding decades since 1850



Globally averaged combined land and ocean surface temperatures

AR5 WGI SPM

Some of the changes in extreme weather and climate events observed since about 1950 have been linked to human influence






AR5 WGI SPM

IIASA, International Institute for Applied Systems Analysis

INTERGOVERNMENTAL PANEL ON climate change

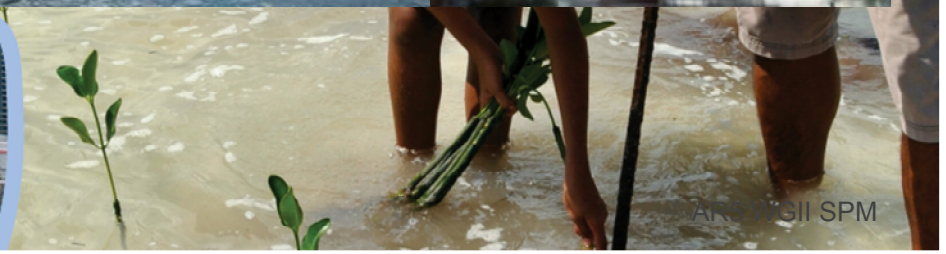
WMO UNEP

Impacts are already underway

- Tropics to the poles
- On all continents and in the ocean
- Affecting rich and poor countries





Projected climate changes

Continued emissions of greenhouse gases will cause further warming and changes in the climate system

Oceans will continue to warm during the 21st century

Global mean sea level will continue to rise during the 21st century

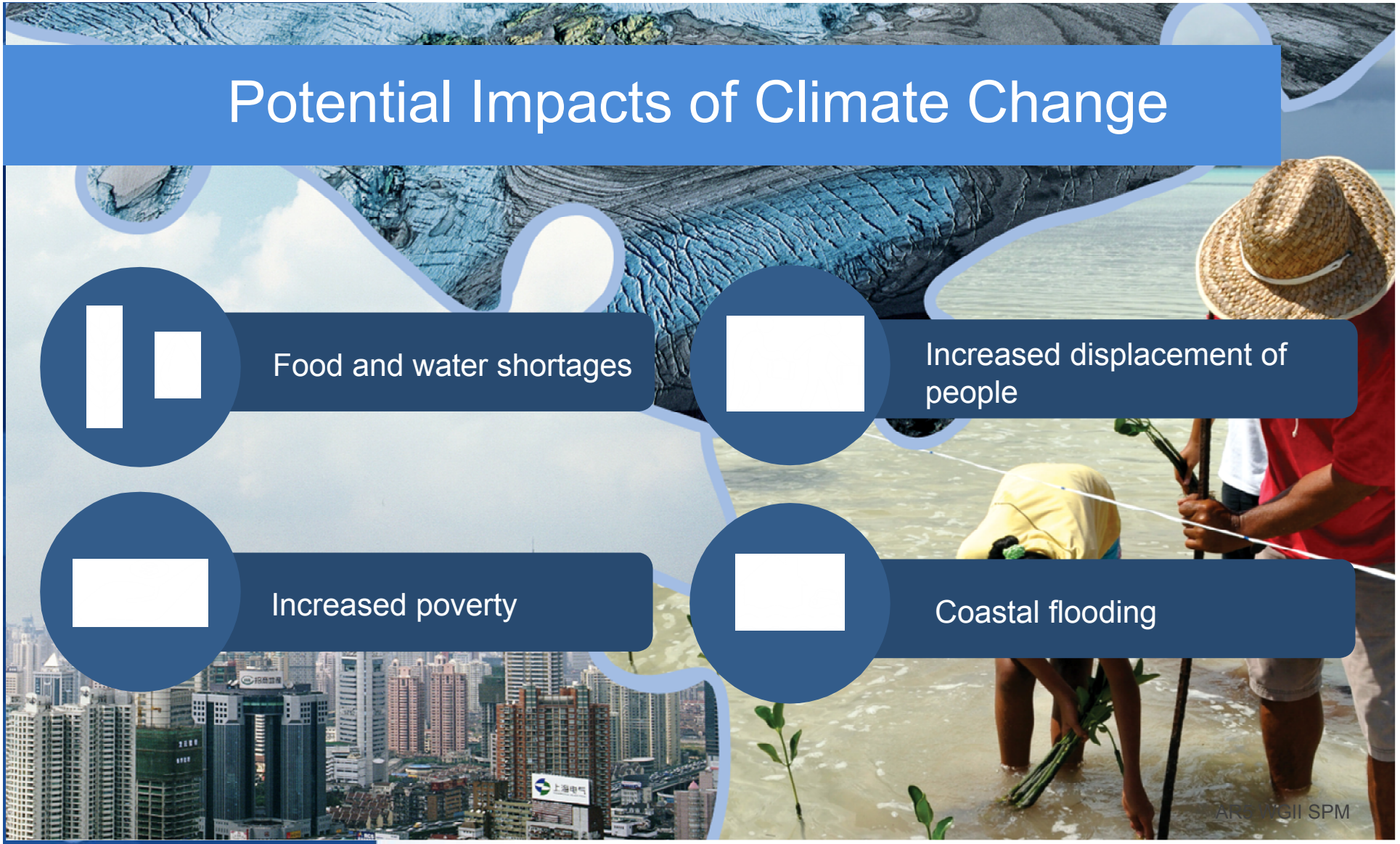
It is very likely that the Arctic sea ice cover will continue to shrink and thin as global mean surface temperature rises

Global glacier volume will further decrease

AR5 WGI SPM

IIASA, International Institute for Applied Systems Analysis
INTERGOVERNMENTAL PANEL ON climate change
WMO UNEP

Potential Impacts of Climate Change



- Food and water shortages
- Increased displacement of people
- Increased poverty
- Coastal flooding

AR5 WGII SPM

IIASA, International Institute for Applied Systems Analysis
INTERGOVERNMENTAL PANEL ON climate change
WMO UNEP

IIASA approach to Climate Compatible Development (CCD) Concept

CCD

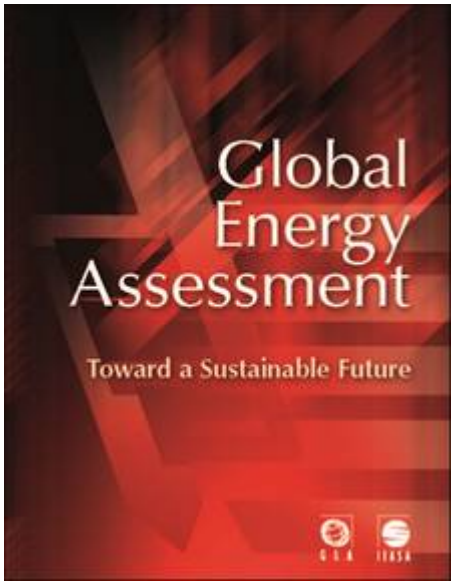
- A strategy that fosters **economic growth and development,** protects natural **ecosystems and the resources and environmental services** they provide, and enhances **socially-inclusive development.**

IIASA systems analysis approach

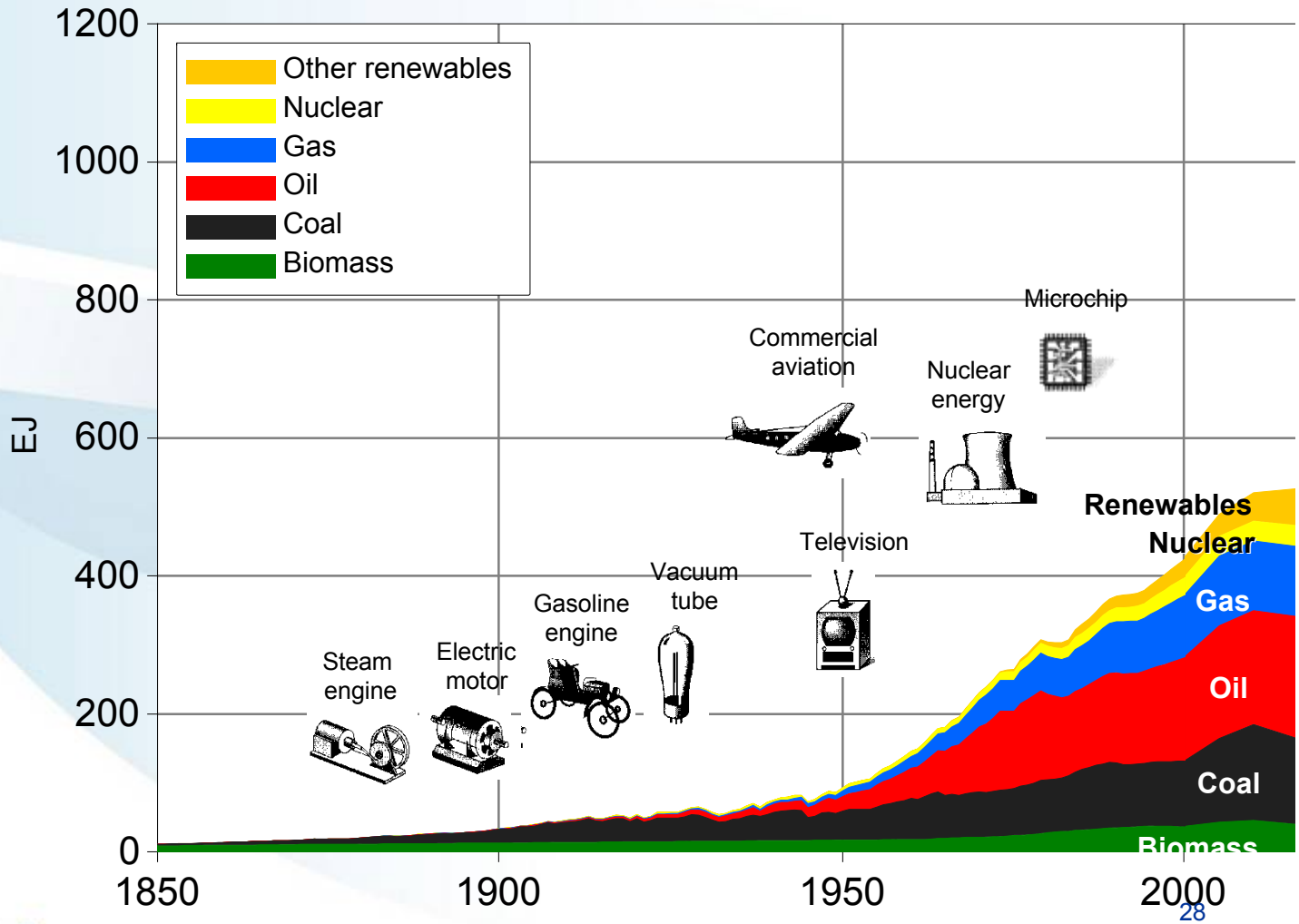
- Climate Compatible Development = all inclusive (sustainable) growth
- Cross-sectoral and integrative synergies and co-benefits
- Value of ecosystems and environmental services
- Green Growth as economic an social opportunity rather then a threat to “classical” economic growth

Benefits of Systems Approach (Example 1)

- 2006-12: Global Energy Assessment involving 500 experts around the world
- 2009 to date: GEA provides critical input to Un Secretary-General's Sustainable Energy For All Initiative including defining the aspirational yet feasible objectives:
  1. Ensure universal access to modern energy services
  2. Double the global rate of improvements in energy efficienc
  3. Double the share of renewable energy in the global energy mix

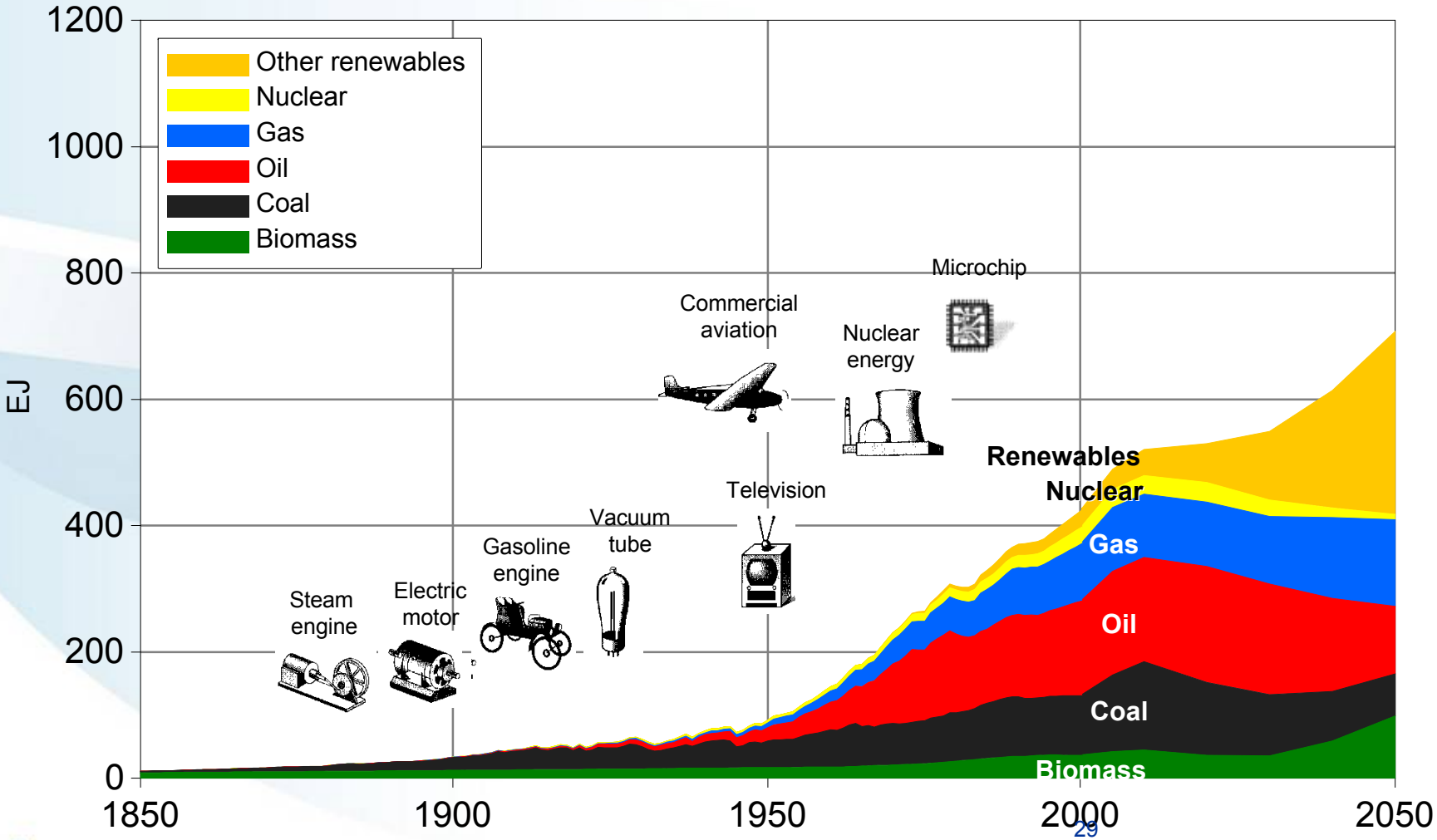


Global Primary Energy



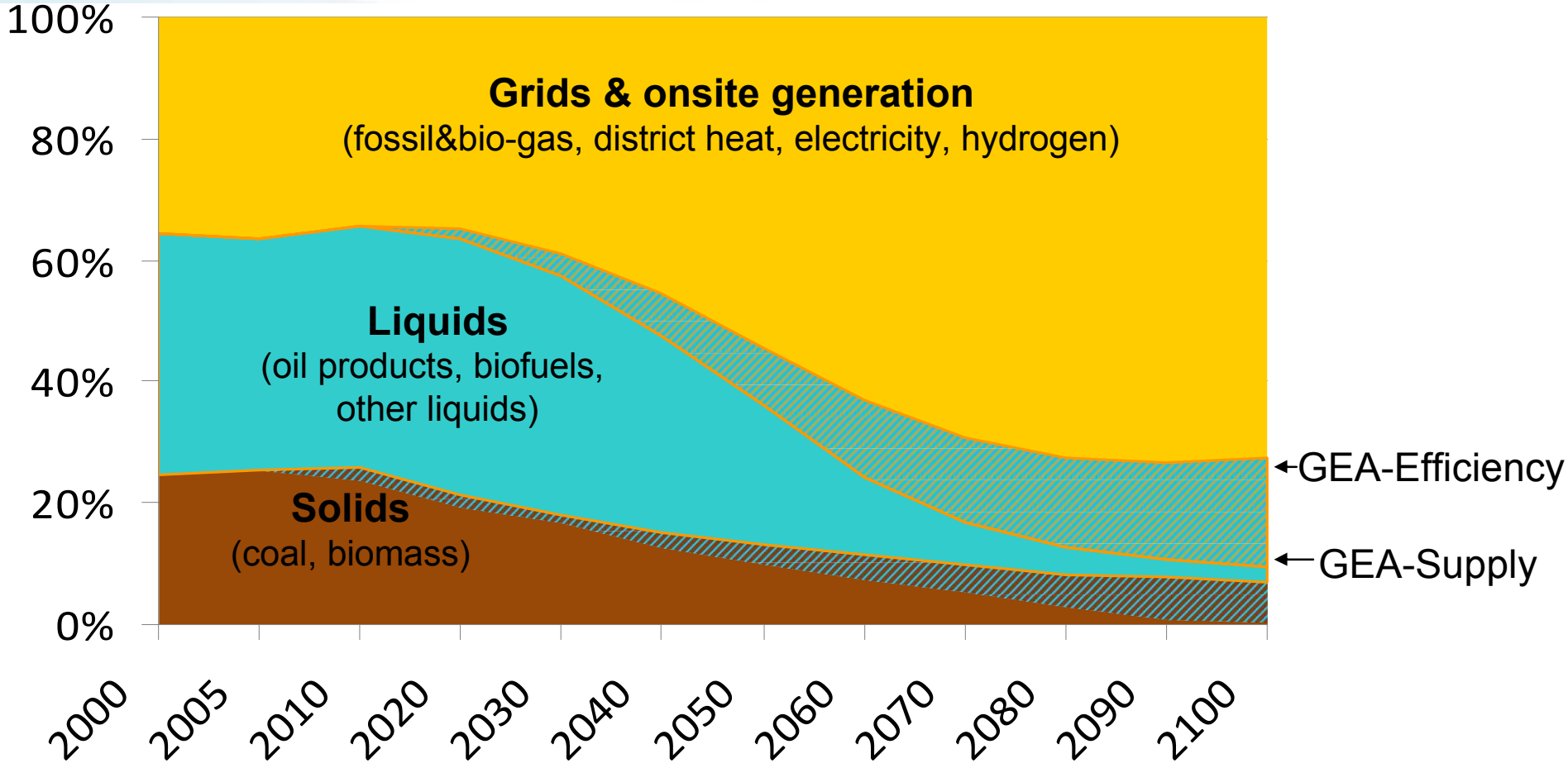
Source: GEA

Global Primary Energy Efficiency



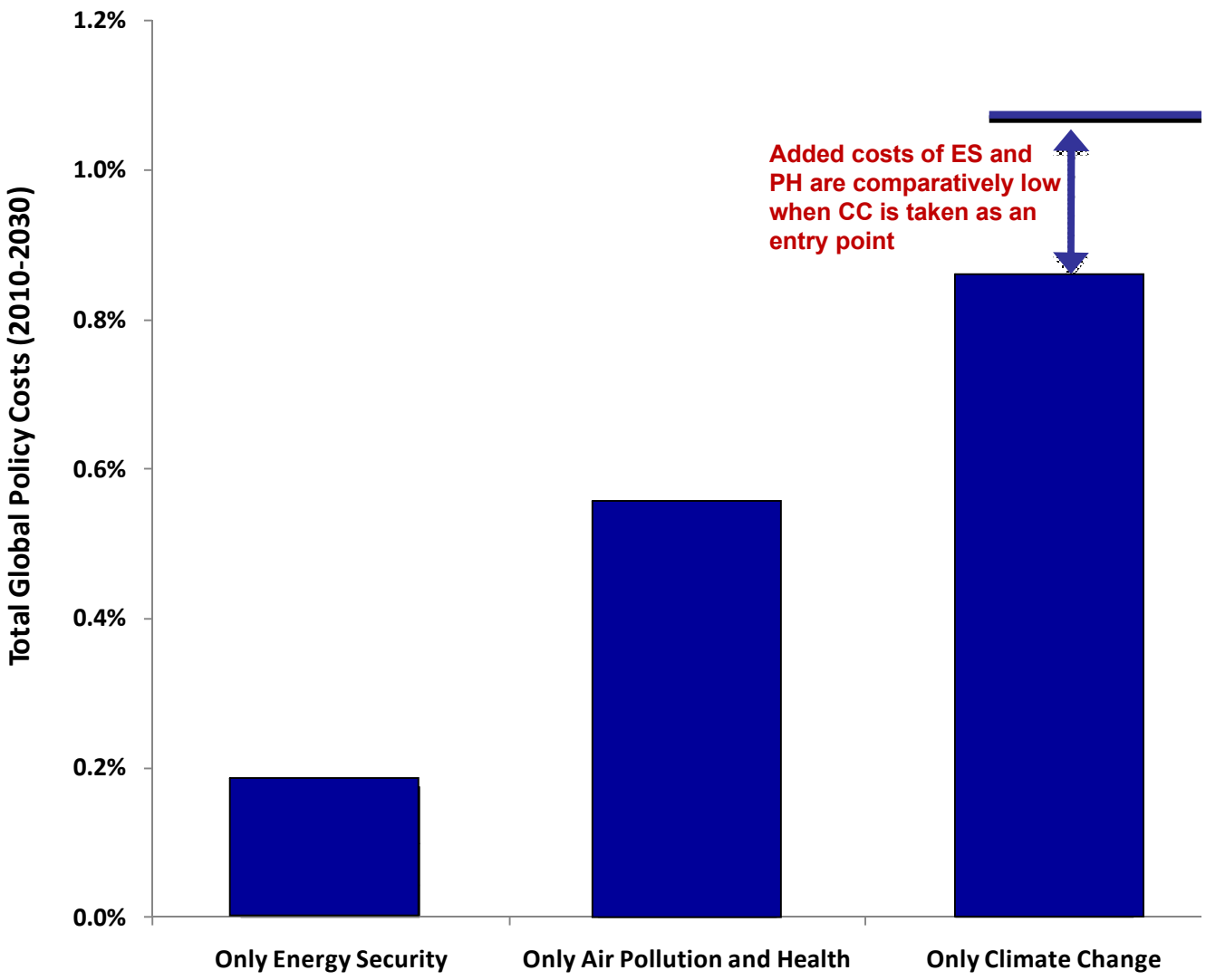
Source: GEA

Final Energy Transformations



Source: GEA

Energy Policy Costs (% GDP)



Source: McCollum, Krey, Riahi, 2012

NL: Climate proofing as climate compatible development concept….

"The climate is changing and we should make our country climate proof. The national government together with science, policy and other stakeholders"

Jan-Peter Balkenende - Dutch Prime Minister, november 2005"

Science - Policy interaction

Vol. 438|17 November 2005 nature

COMMENTARY

Climate proofing the Netherlands

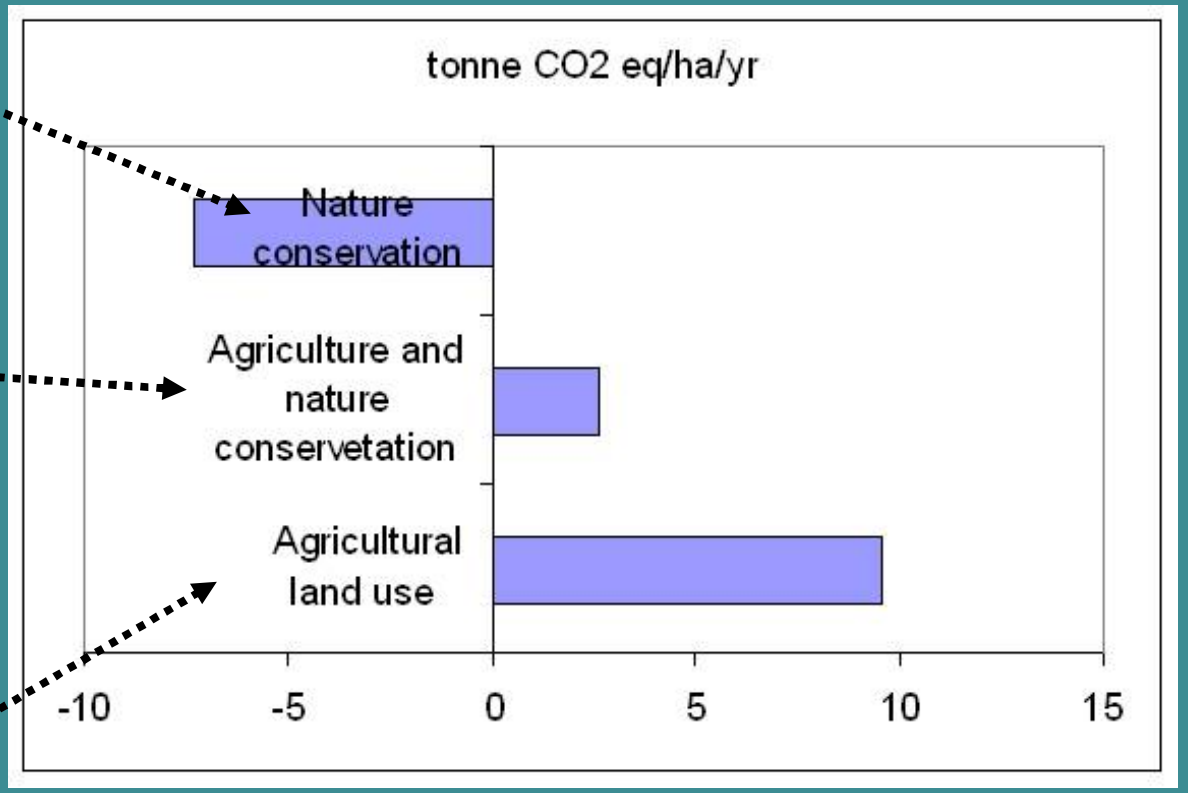
Regional climate change should not be seen only as a threat; changes to weather patterns could generate opportunities for large-scale innovations, say **Pavel Kabat**, **Pier Vellinga** and their colleagues.

Example: Climate Compatible agricultural Development

- Climate friendly development (mitigation)
  - development that leads to low GHG emissions (nitrate/energy)
- Climate safe development (adaptation)
  - development that leads to low vulnerability to direct (temperature and water) and indirect (flooding, saline intrusion) effects of climate change

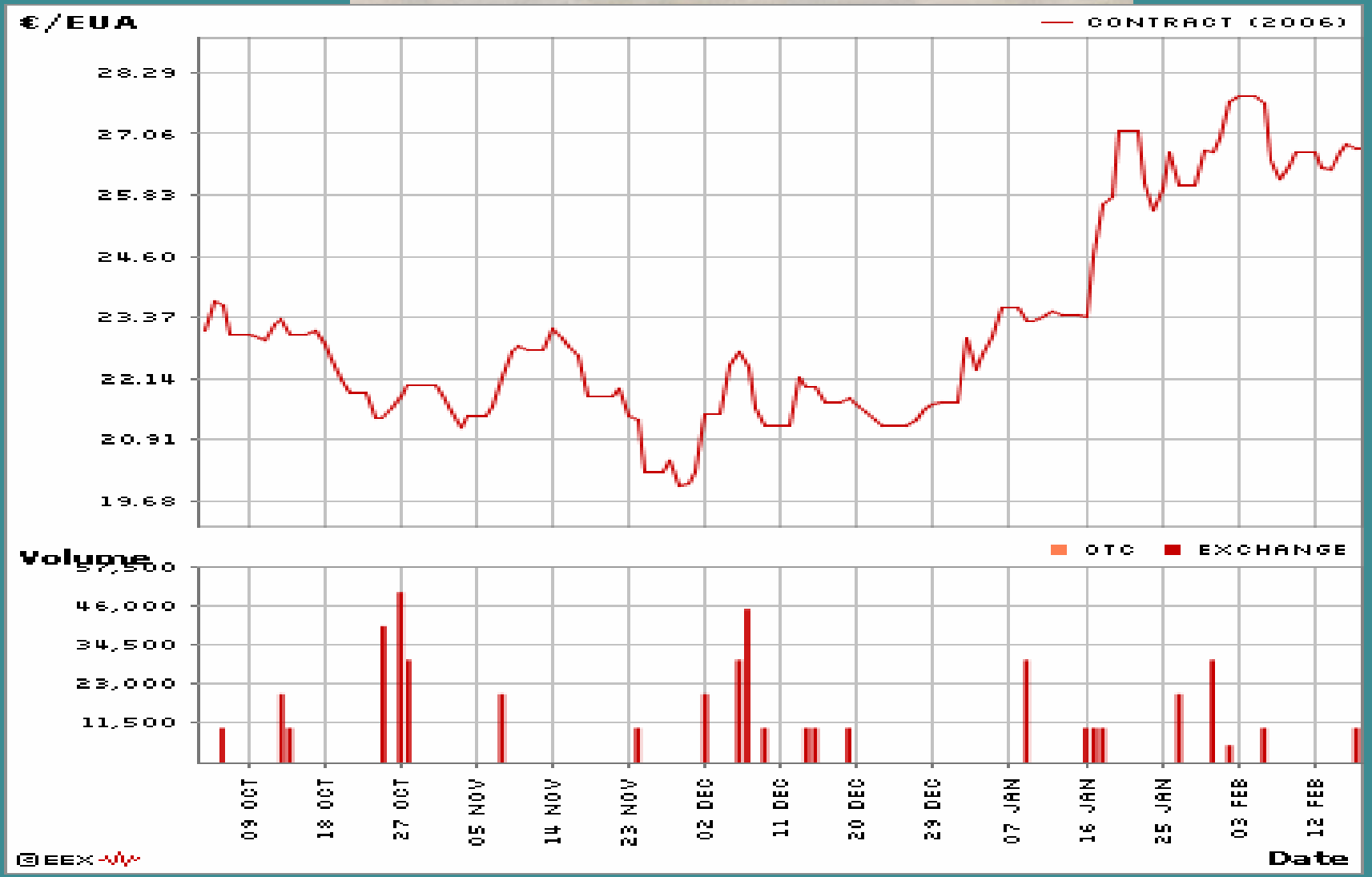
Land use planning: adaptation & mitigation

GHG balance in peat meadow area

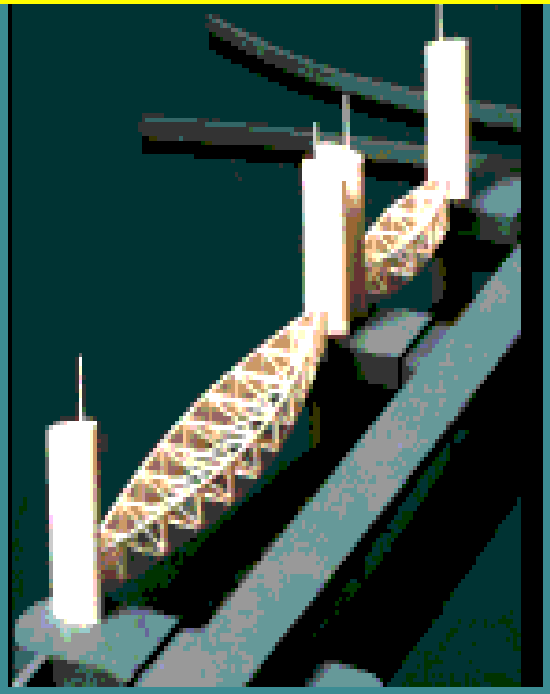


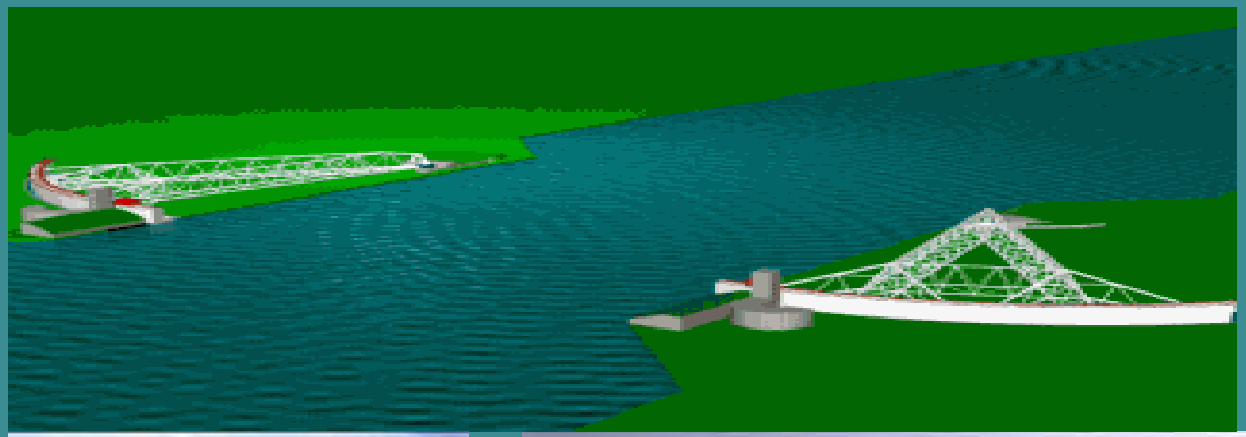
vd Born et al. 2003 (RIVM)

Make many with greenhouse gas….



Netherlands: Are there land use alternatives to coastal flood protection?





***Working* together with water**
A living land builds for its future

Findings of the *Deltacommission* 2008

www.deltacommissie.com/en/advies

Nature Geoscience | VOL 2 | JULY 2009 |

commentary

Dutch coasts in transition

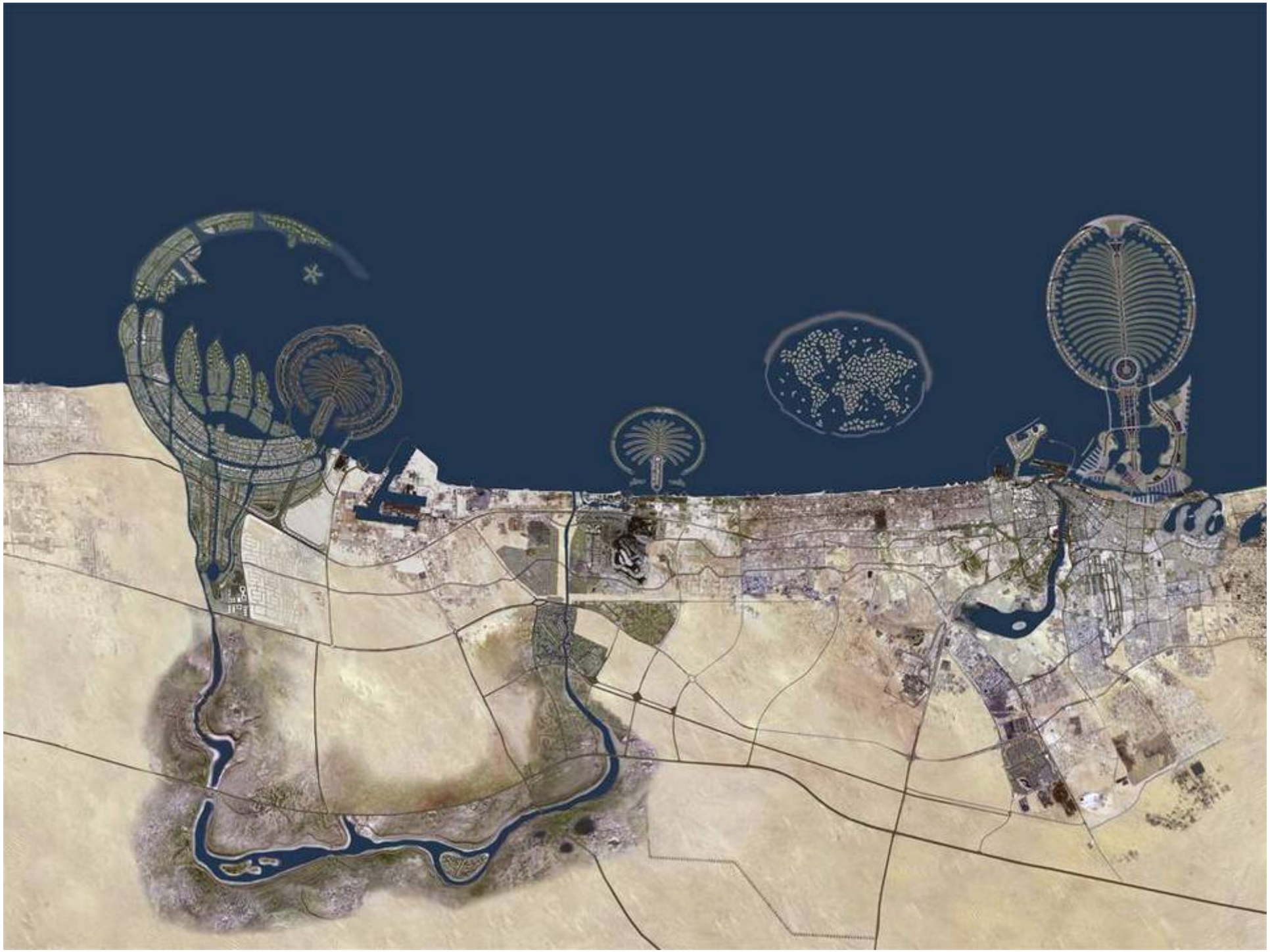
Pavel Kabat, Louise O. Fresco, Marcel J. F. Stive, Cees P. Veerman, Jos S. L. J. van Alphen, Bart W. A. H. Parmet, Wilco Hazeleger and Caroline A. Katsman

The Netherlands has a long and varied history of coastal and river flood management. The anticipation of sea-level rise during the twenty-first century has renewed the push for sustainable solutions to coastal vulnerability.

The Netherlands is a densely populated country situated primarily in coastal lowlands. The Dutch coast, which is entirely along the North Sea, is 350 km long. At present, nine million residents of the Netherlands live in the coastal areas — vast regions at an elevation below sea level. Roughly 65% of the country's gross national product — about €400 billion — is generated in this region; the harbours and airports scattered throughout the lowlands are vital to the country's infrastructure and serve as important international transport routes for

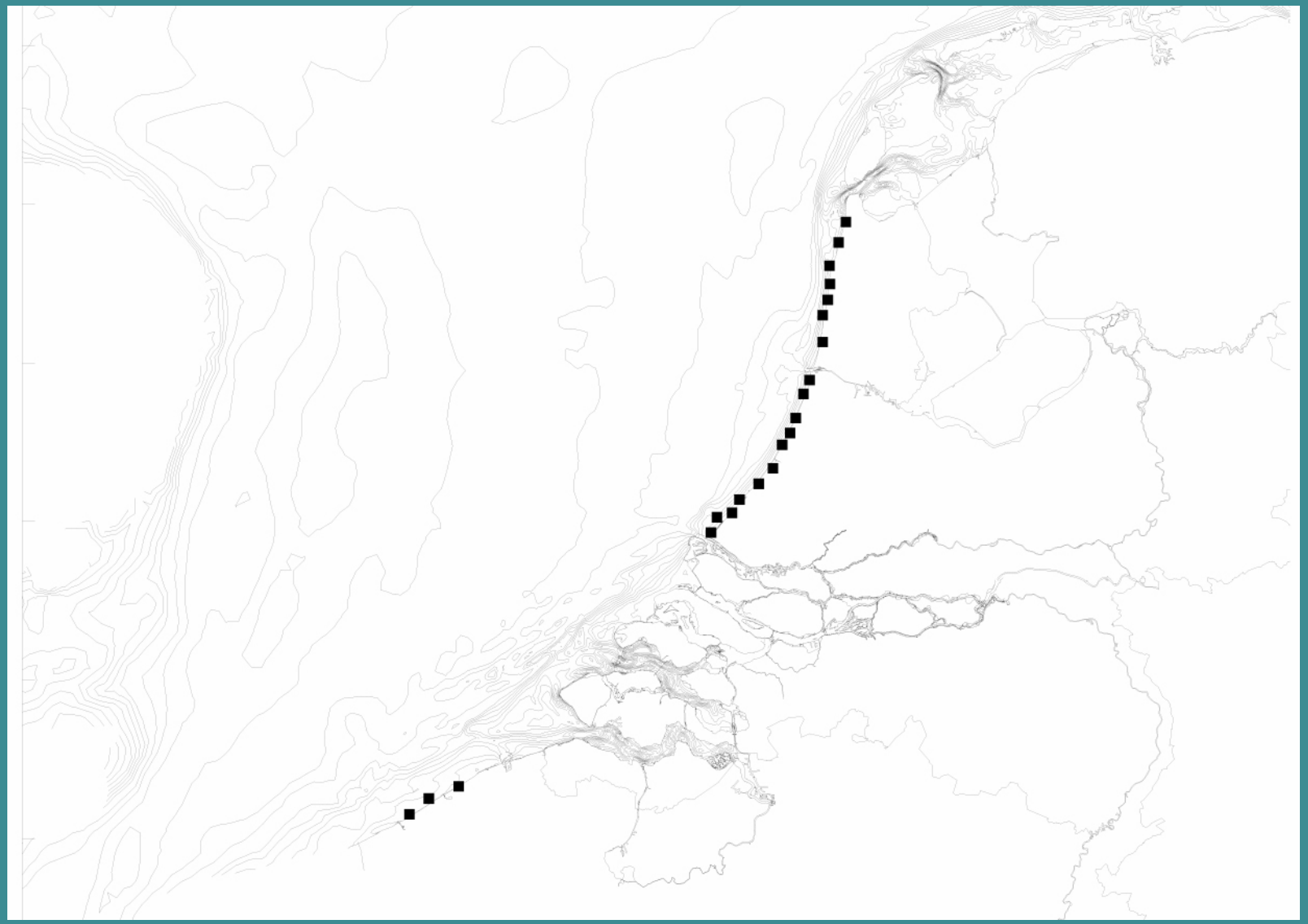
However, as revealed in the 2006 audit conducted by the Ministry of Transport, Public Works and Water Management, between 24 and 56% of current coastal defences do not even meet the old standards (see Fig. 1). And of course, the number of people and the value of the property that need to be protected from flooding has grown steadily.

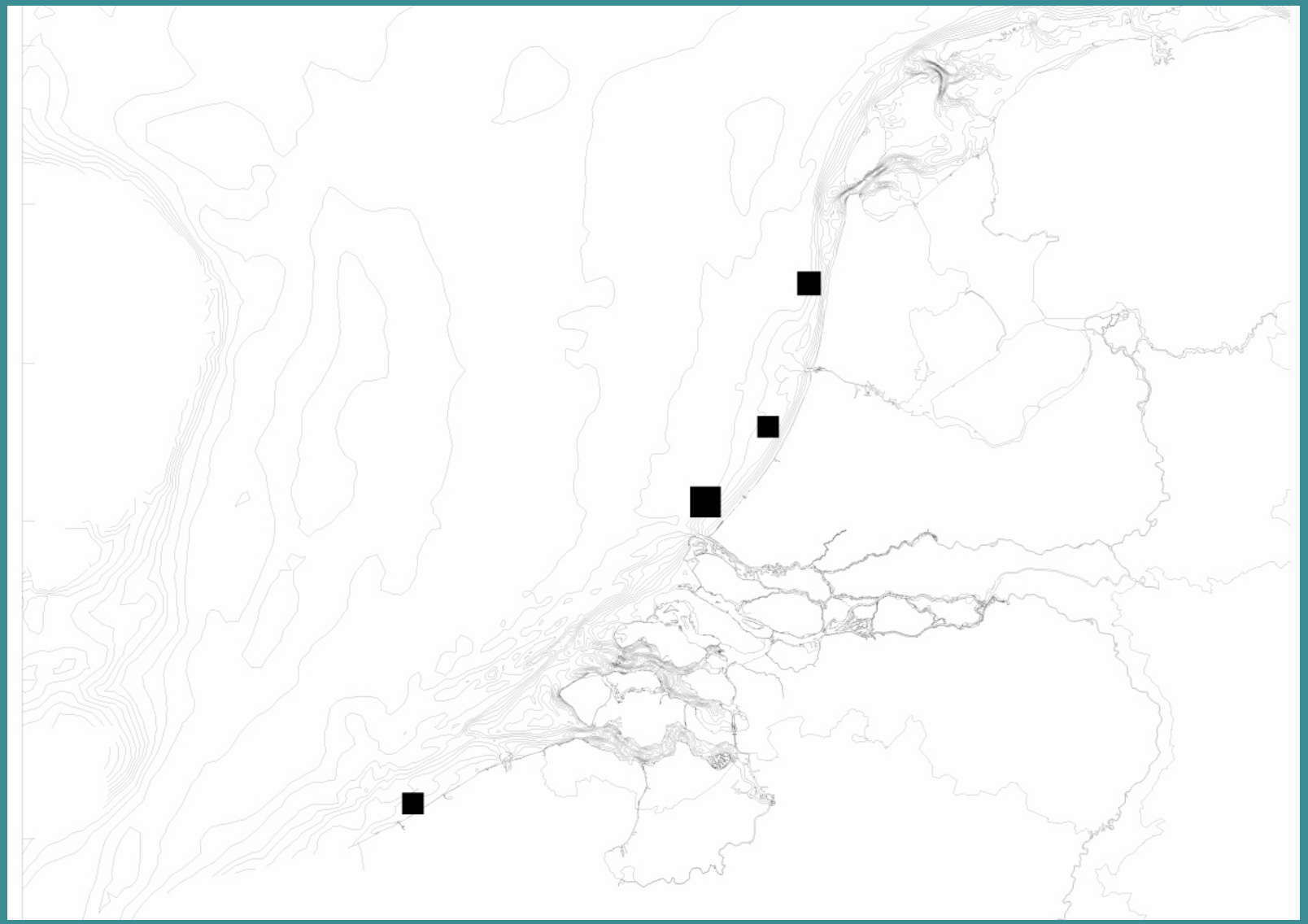
A changing climate and the anticipated rise in sea level will only add to the challenges faced by the aging flood defence system. The Dutch government not only recognized the growing vulnerability of

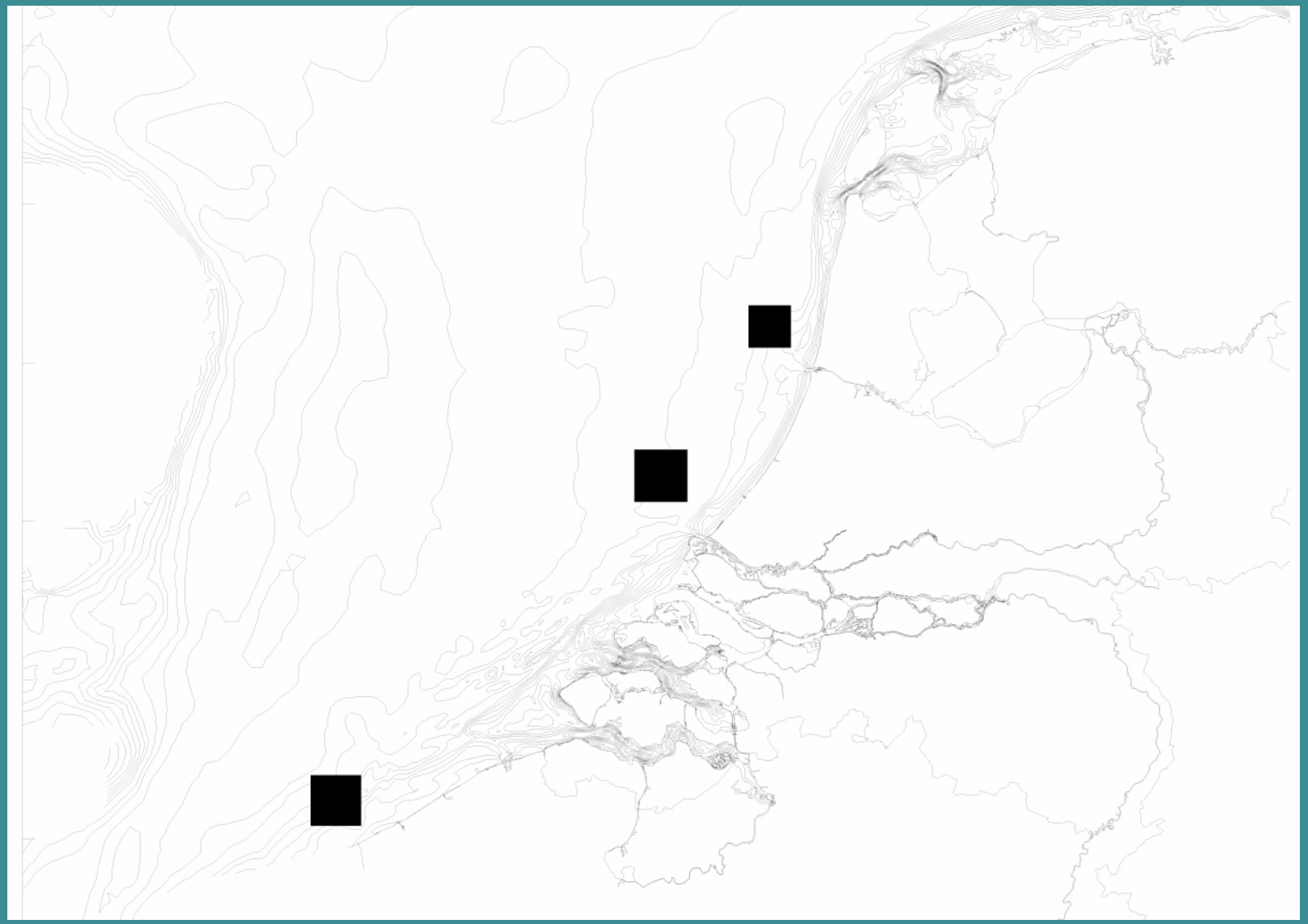


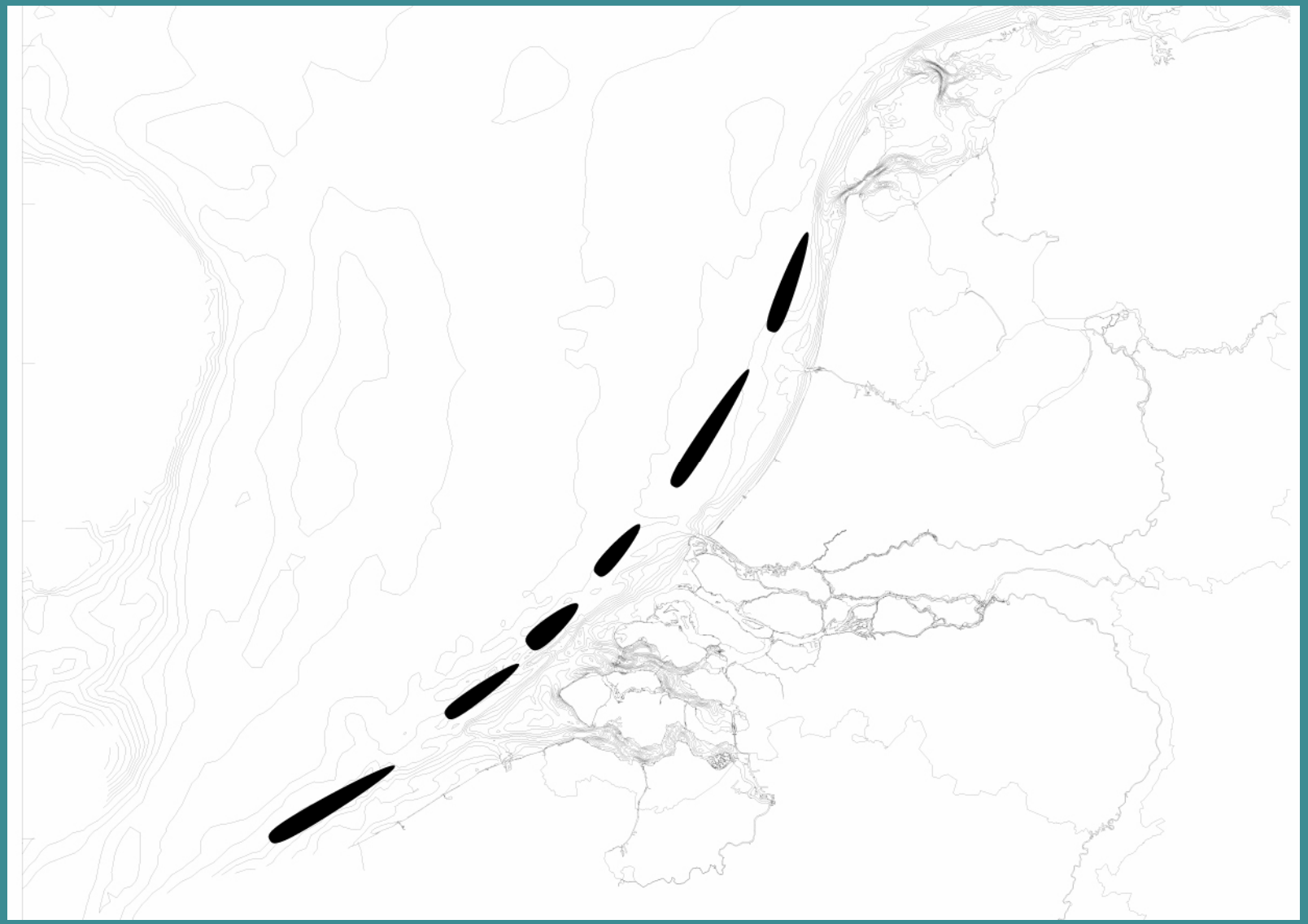
“Building with Nature”

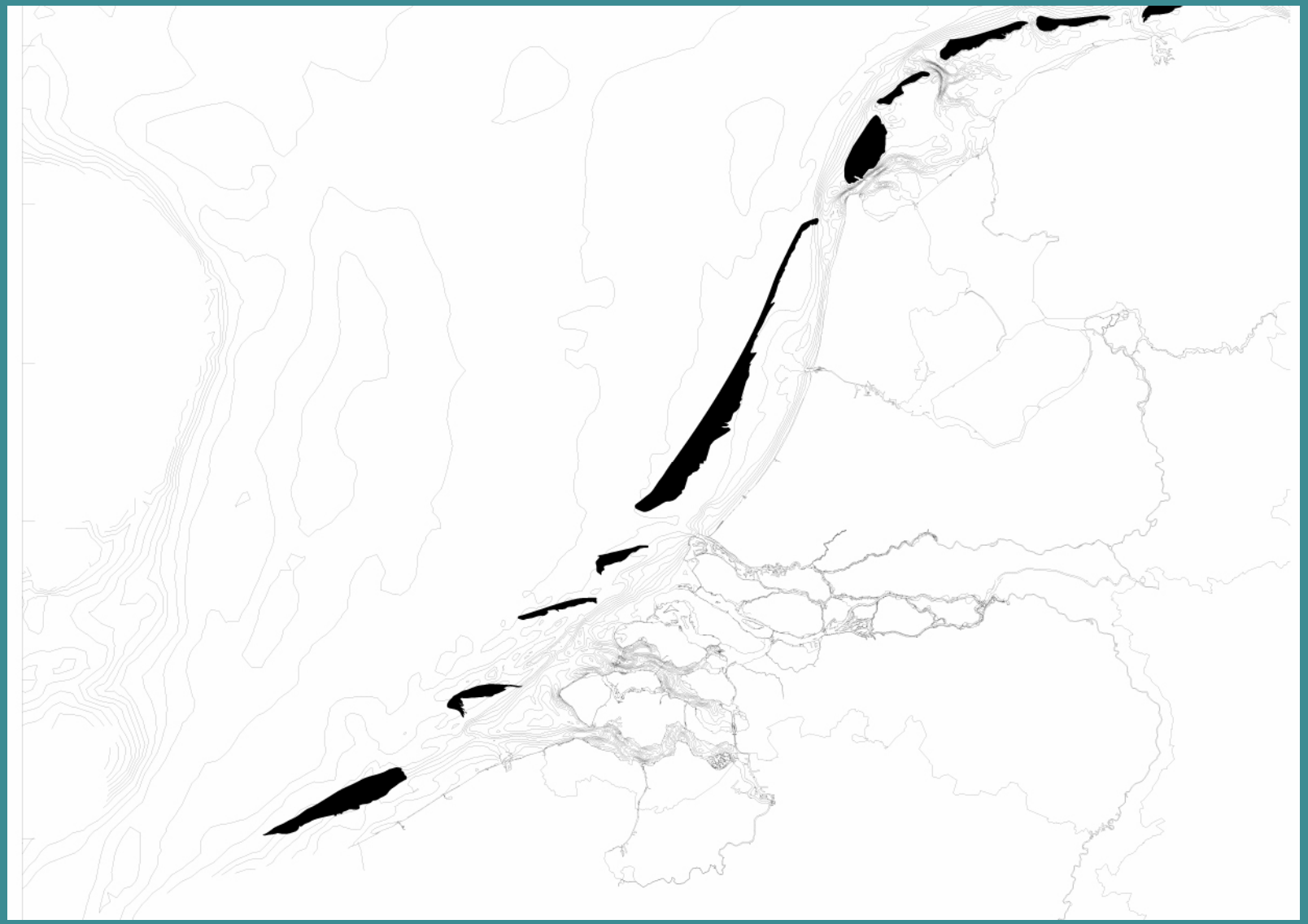
- Flexible regarding changing conditions and societal values, and increased understanding
- Cost-effective
- Opportunities for integrated and multifunctional approach



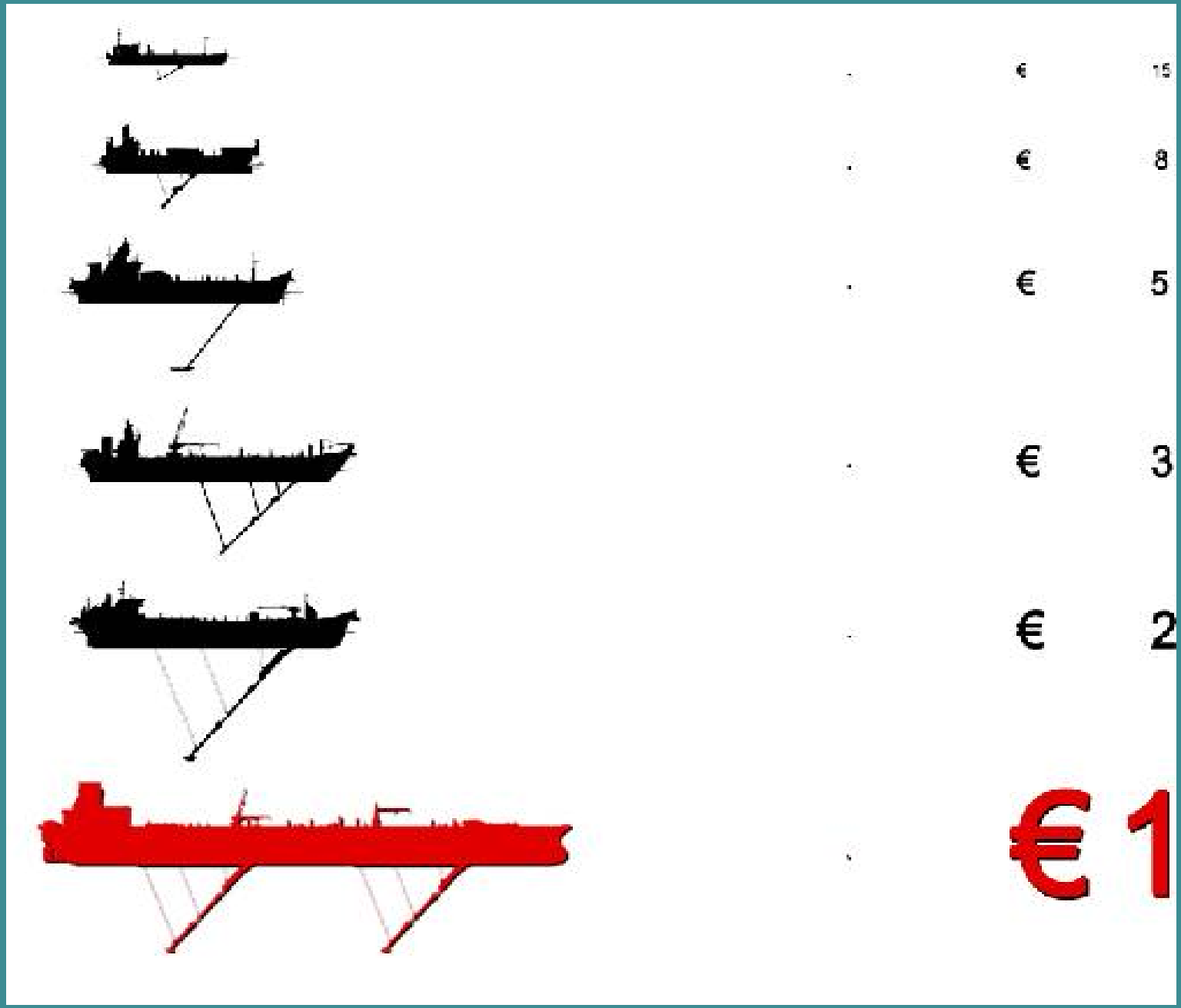








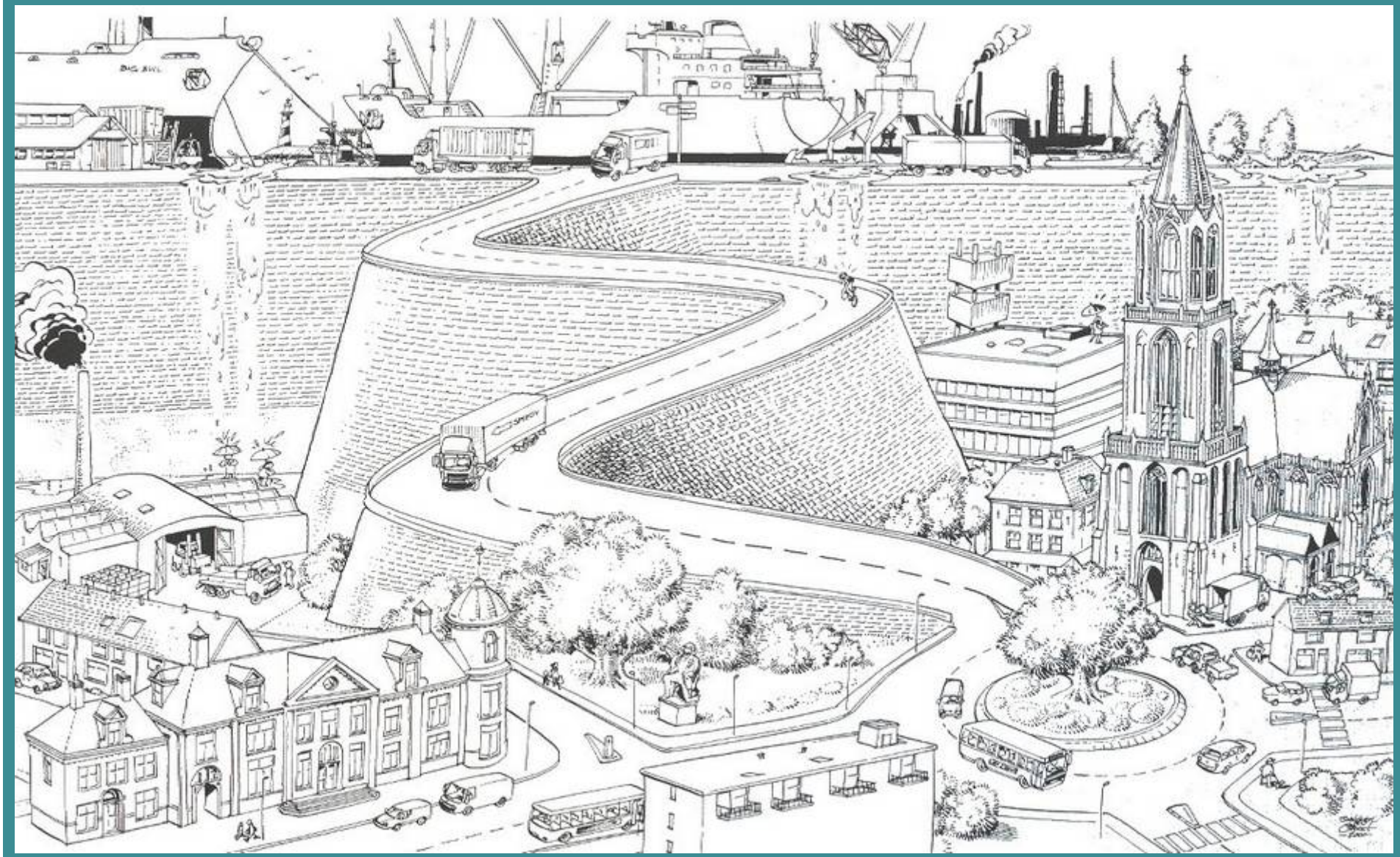

URSA



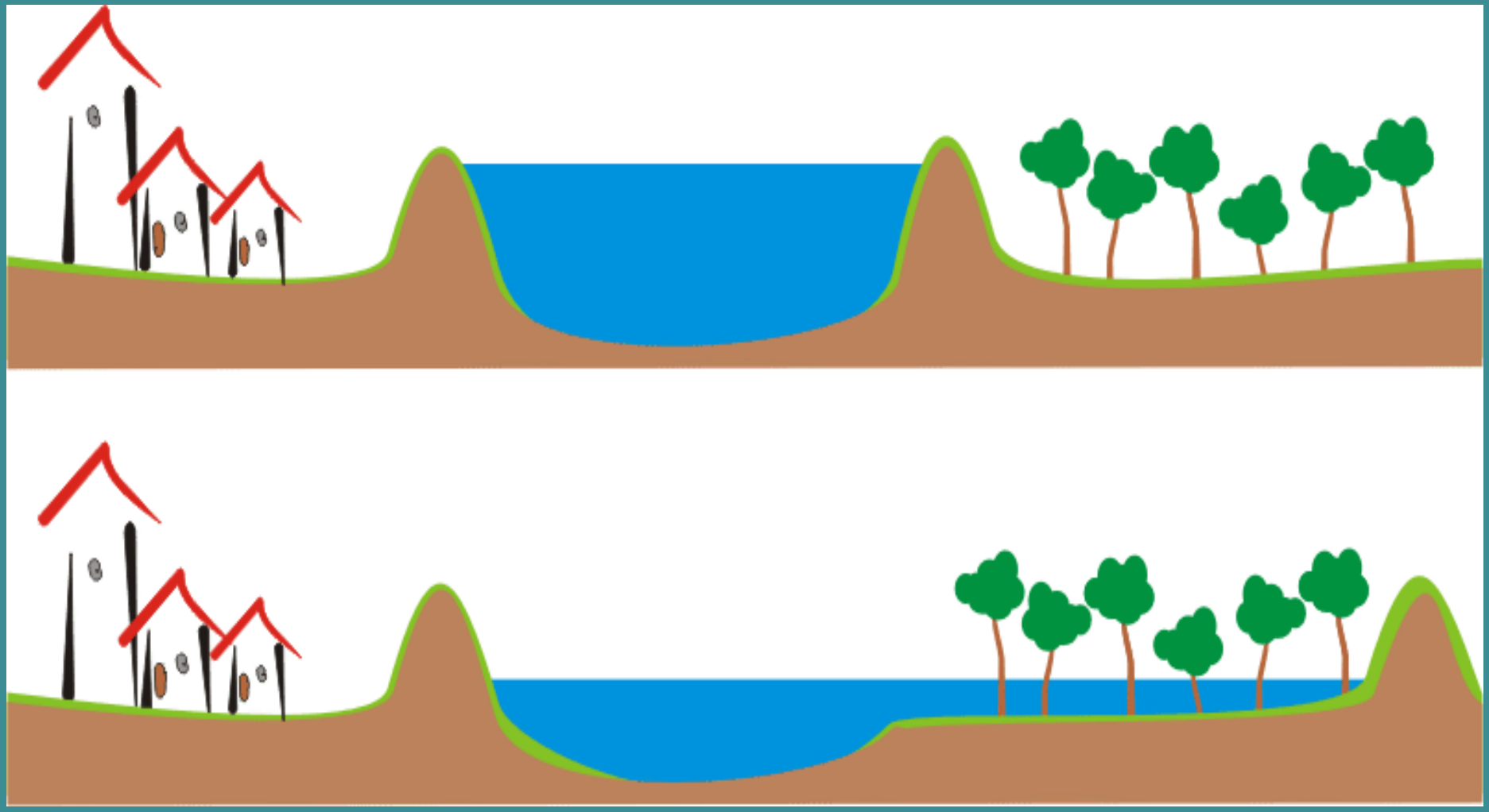
40.000 ton

80.000 ton

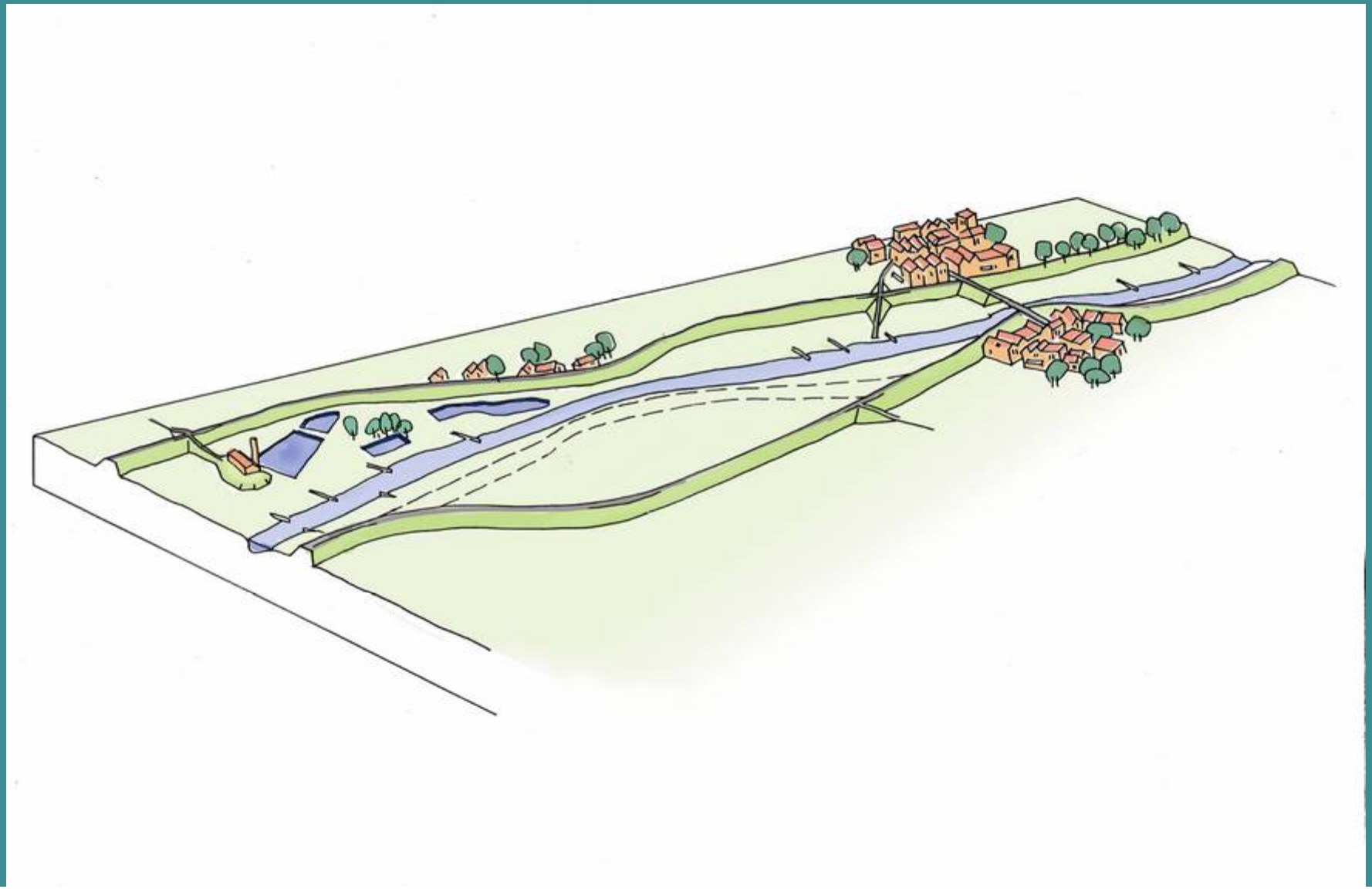
Are there (land use based) alternatives?



…. sustainable planning – Room for the river



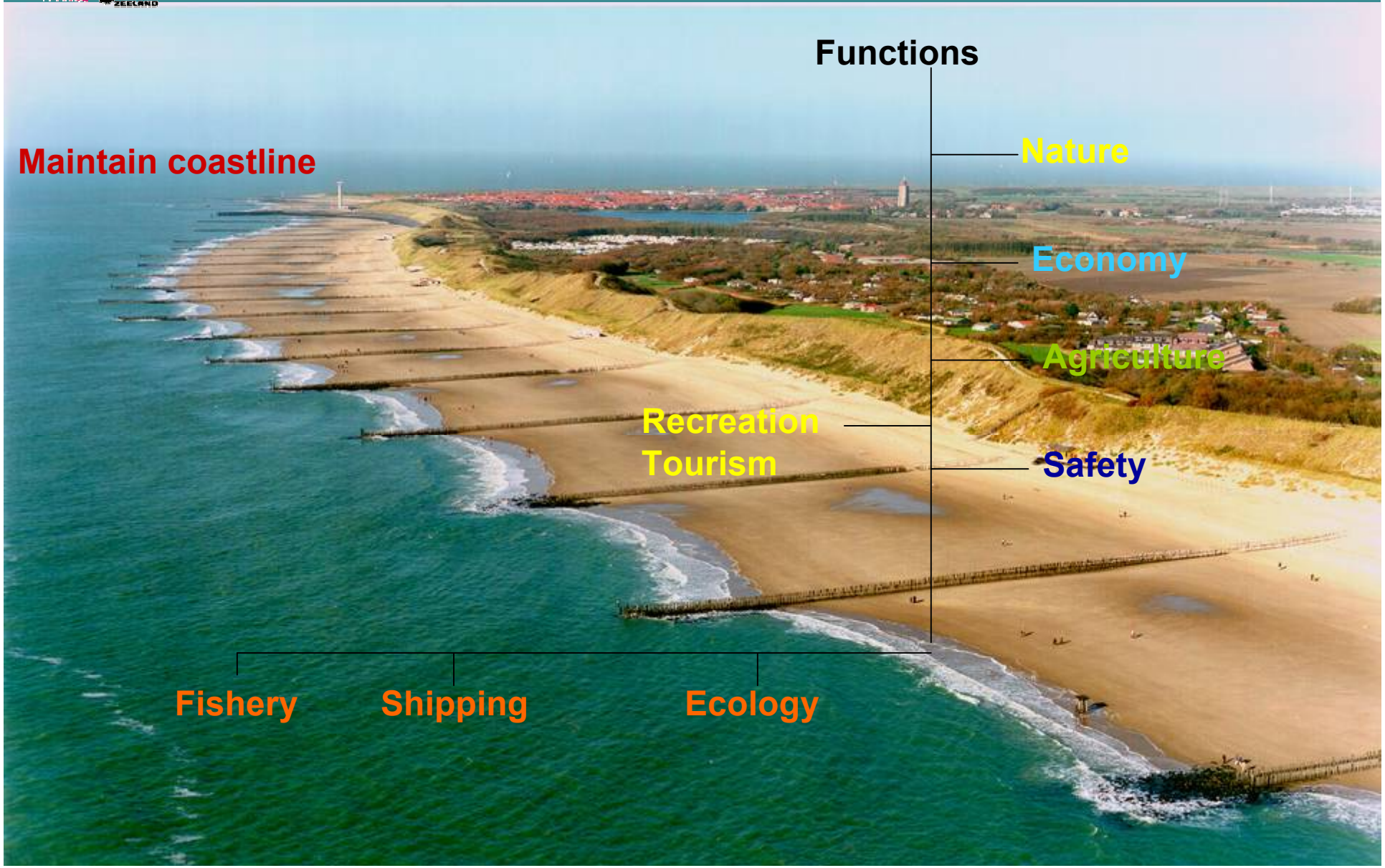
Laying back dykes



Retention areas

Green rivers

Functions in coastal zone



Integrated versus sectoral

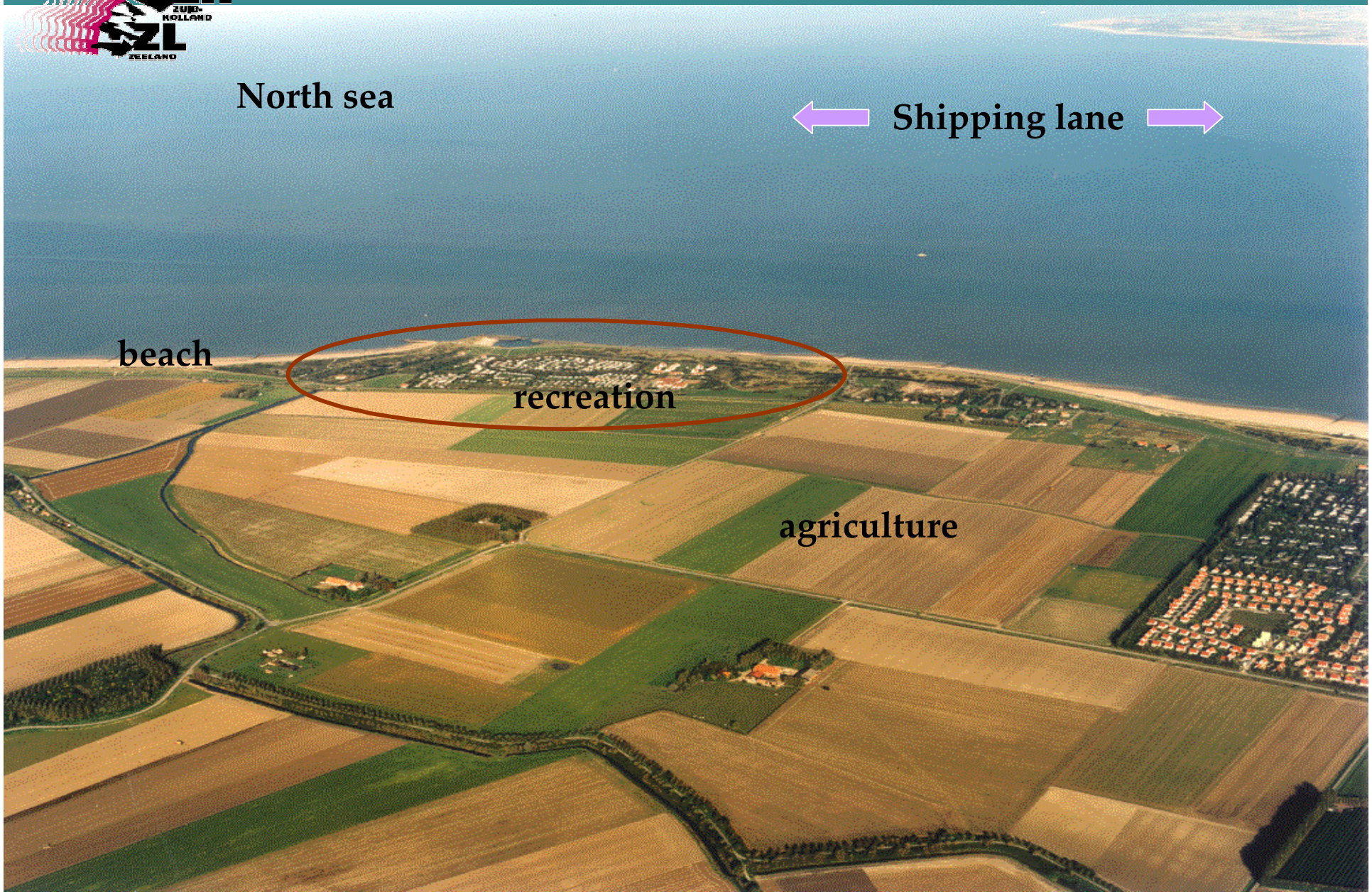
Integrated		Sectoral
More sectors:	⟷	One sector:
Safety Nature Recreation Landscape	⟷	Safety

Stakeholders

- Province of Zeeland
- Local Water boards
- Municipalities
- Private investors
- NGO's
- Local population
- Ministry of Water Management and Transport

Numerous workshops

Example of integrated solution



Example of integrated solution

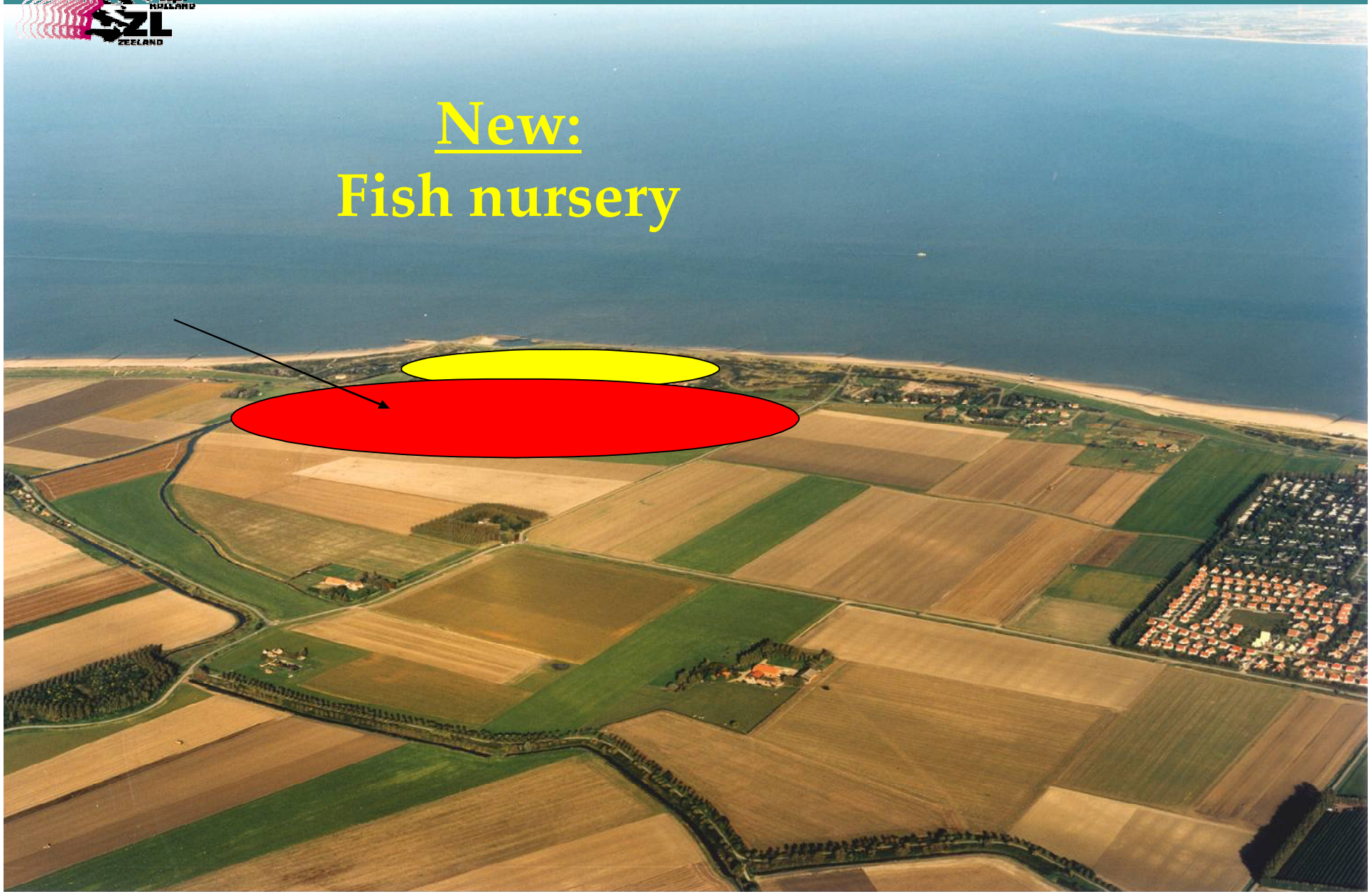
Example of integrated solution

Example of integrated solution

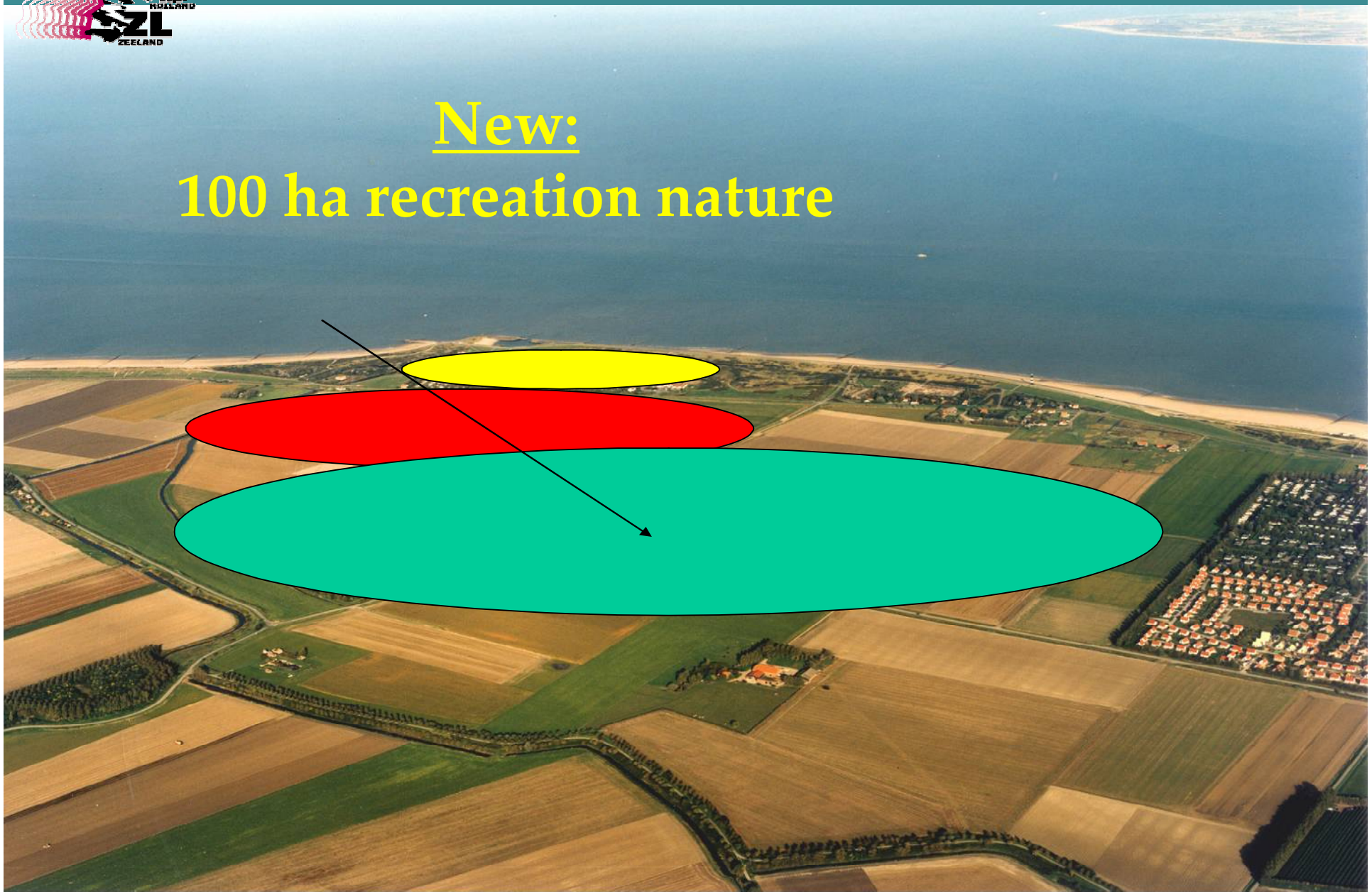
New:

14 ha dune campsite

Example of integrated solution



Example of integrated solution



Main ingredients of …(a success?)

(1) Incorporate Climate Compatible Development (CCD) strategies and measures in existing (cross-)sectoral investment plans, rather than creating climate solutions on its own

(2) Incorporate existing uncertainties in CCD strategies

(3) Innovative solutions are not only technological (multiple economic growth and business opportunities

(4) Continuous dialogues and communication between science, policy and investors/private sector
(Principle of co-creation and CoPs)

.....a threat or an opportunity?

Thank you and welcome soon at IIASA...!

www.iiasa.ac.at