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

science for global insight

Integrated Assessment Contribution to TWI 2050

Nebojsa Nakicenovic

Deputy Director General

International Institute for Applied Systems Analysis

Professor Emeritus of Energy Economics

Vienna University of Technology

The World in 2050 (TWI2050) Interactive Science Meeting, IIASA, Laxenburg, Austria, 10-12 March 2015

SUSTAINABLE DEVELOPMENT SOLUTIONS NETWORK
A GLOBAL INITIATIVE FOR THE UNITED NATIONS

Strategic objective of TWI2050 initiative

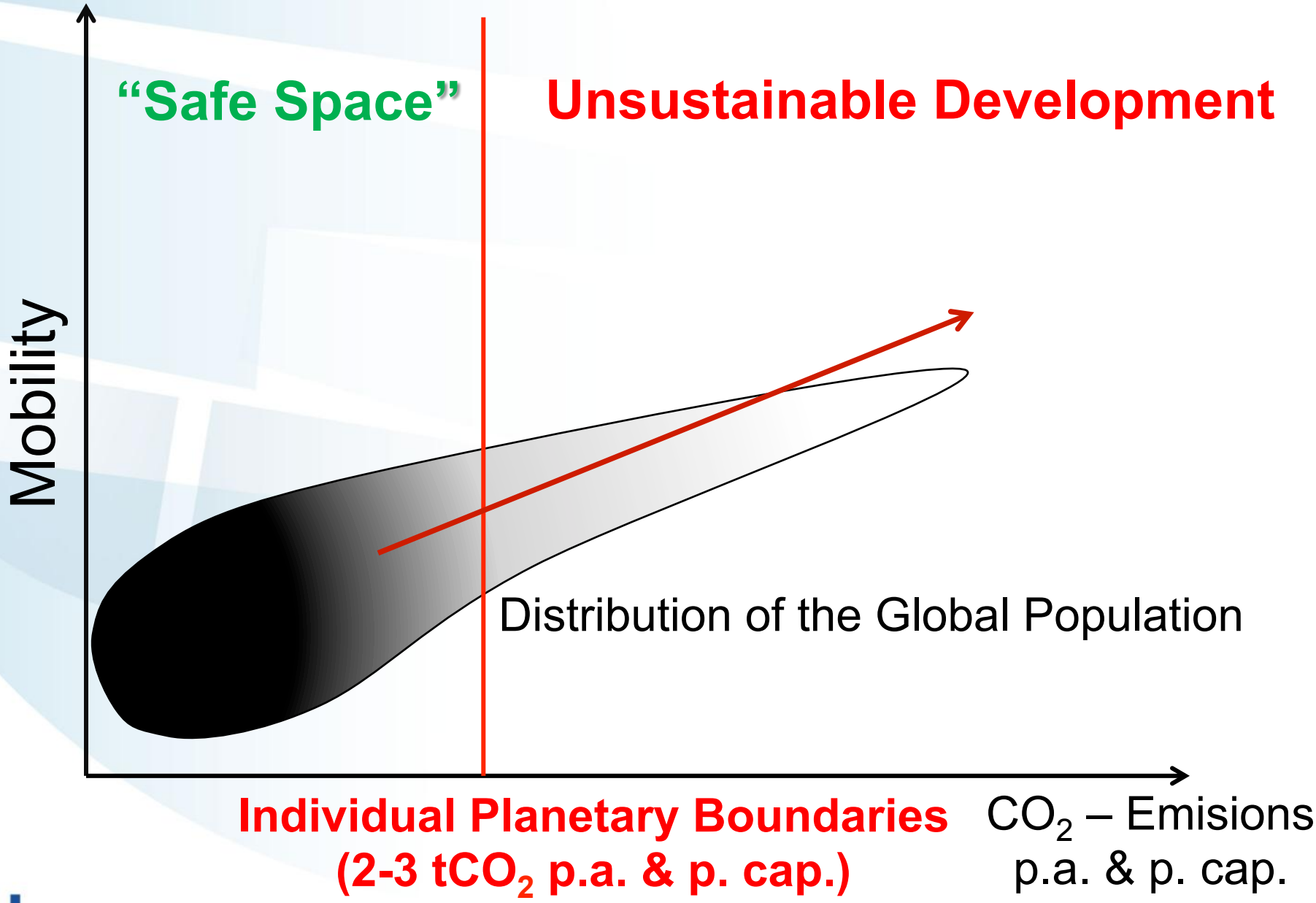
The World in 2050 project will explore the design of sustainable development pathways at the global and regional scales that achieve convergent economic and social development within planetary boundaries

Stockholm Resilience Centre
Sustainability Science for Biosphere Stewardship

IIASA

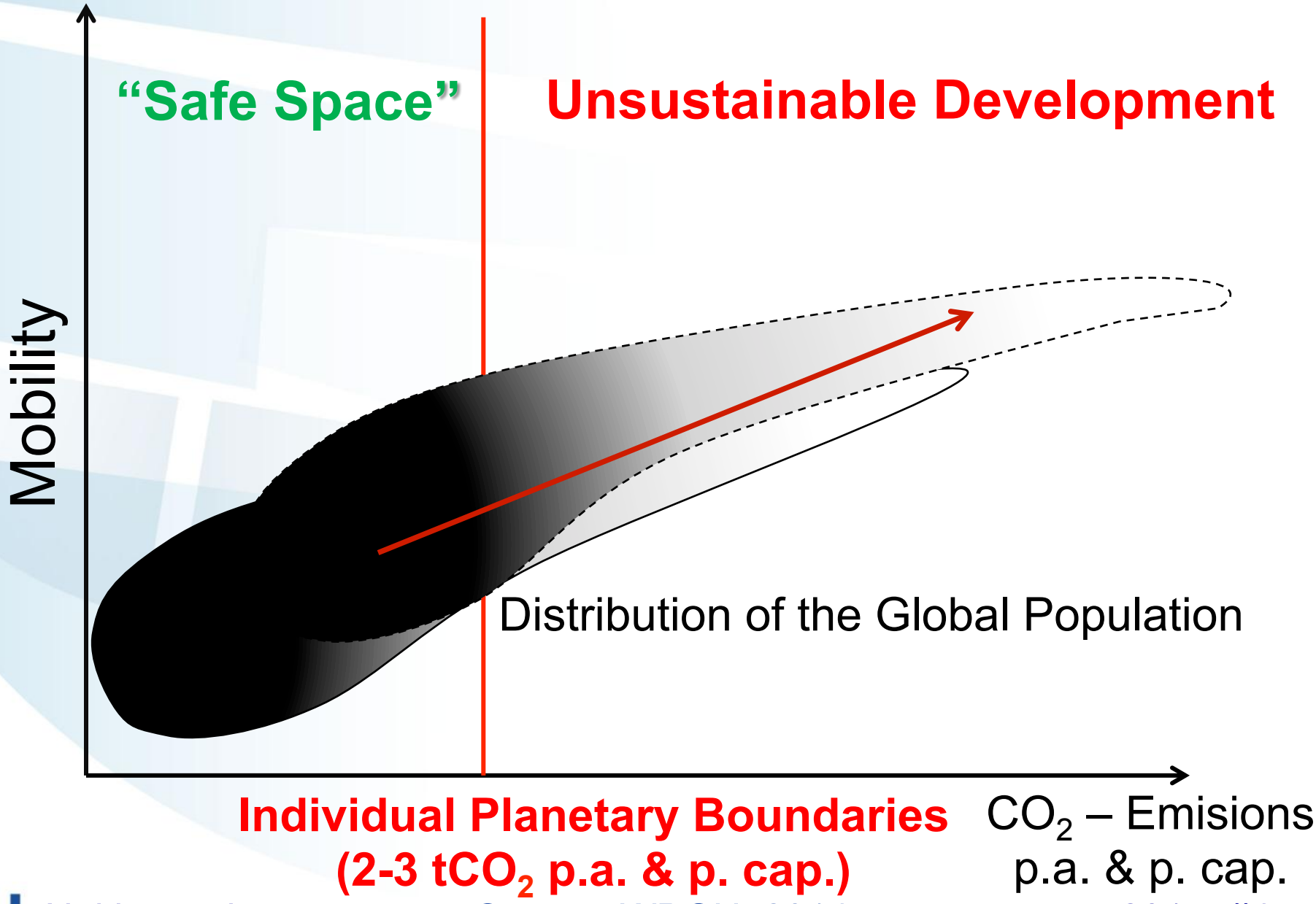
THE EARTH INSTITUTE
COLUMBIA UNIVERSITY

Transformational and "BAU" Paradigms



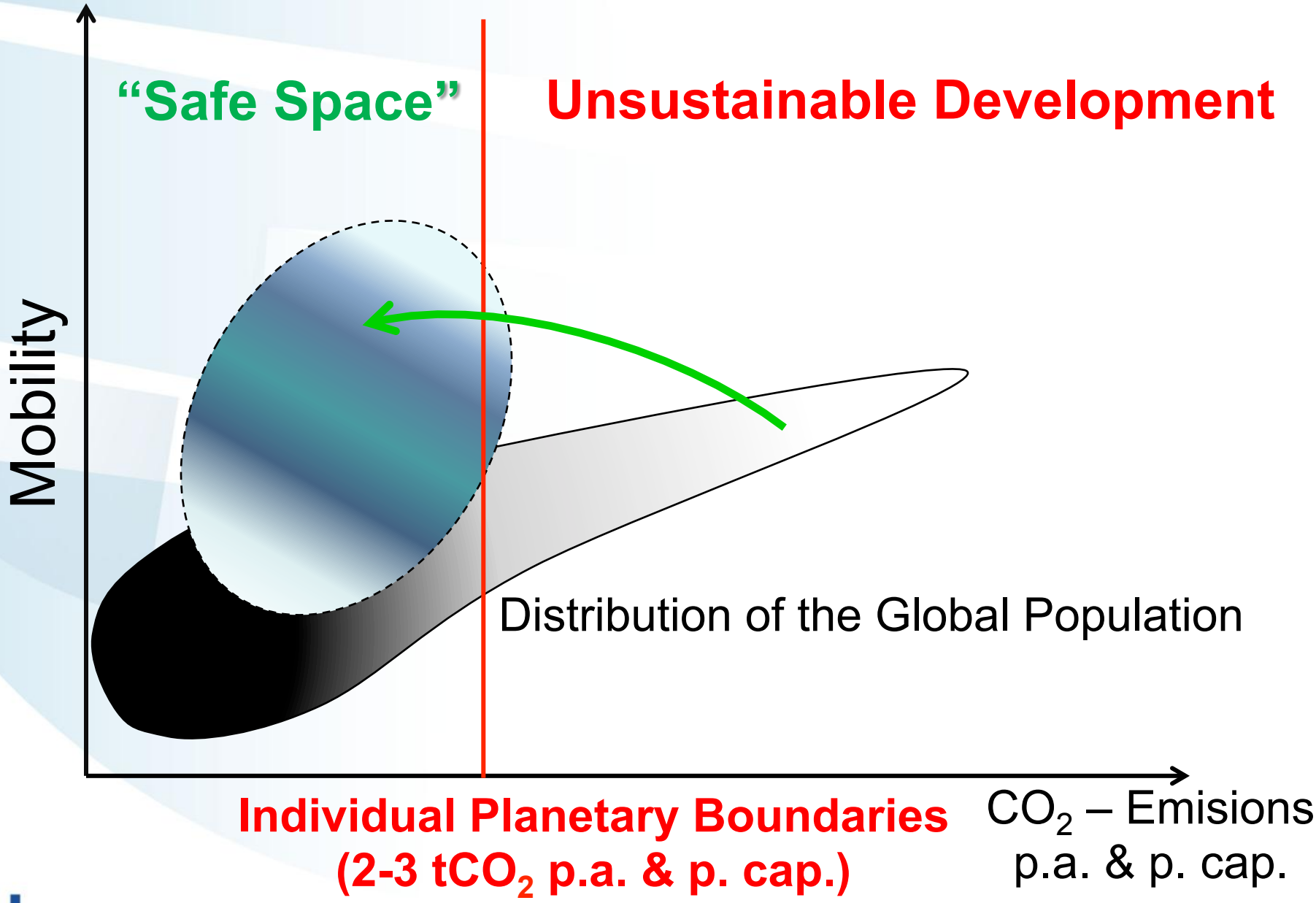
Source: WBGU, 2014

Transformational and "BAU" Paradigms



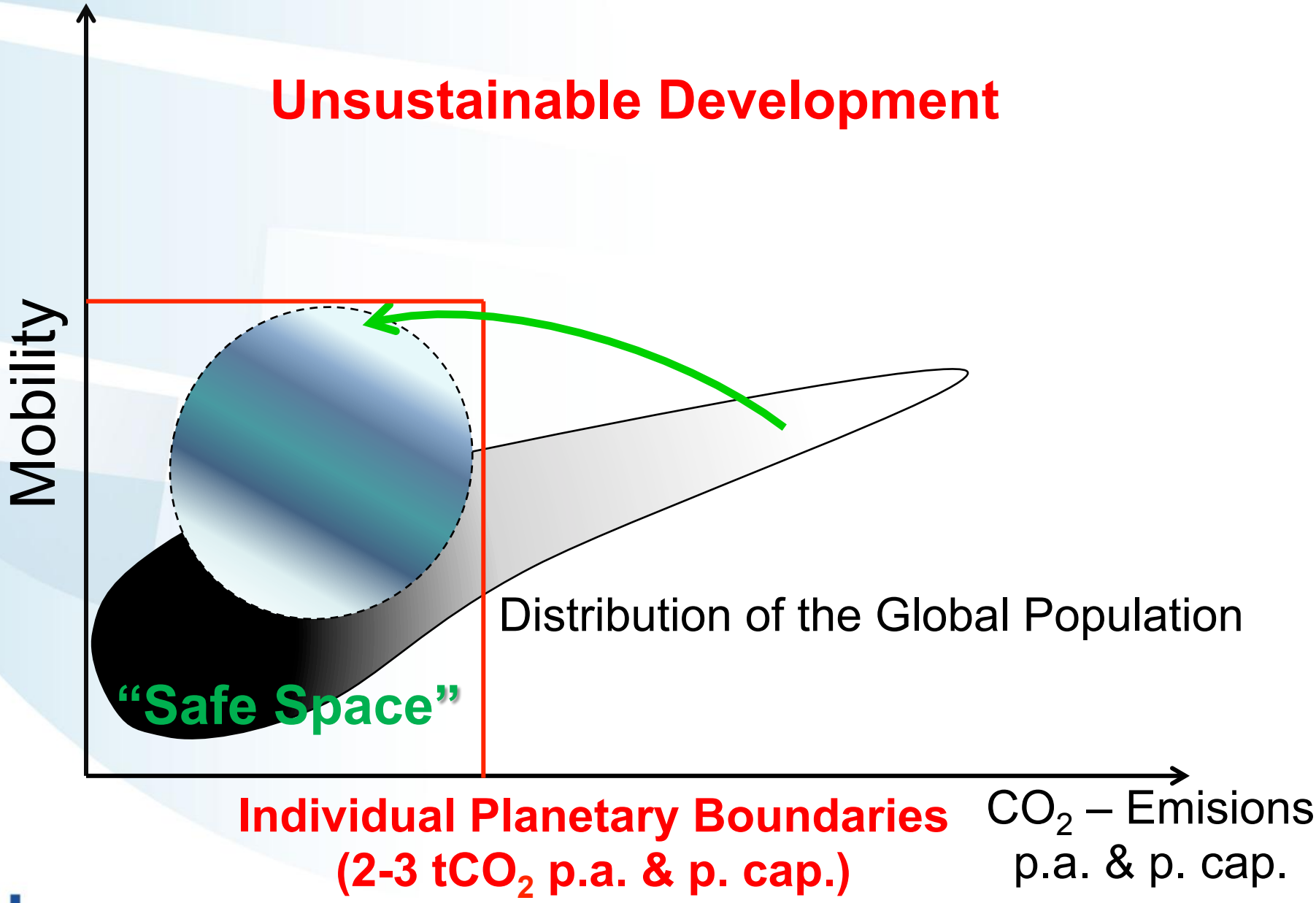
Source: WBGU, 2014

Transformational and "BAU" Paradigms



Source: WBGU, 2014

Transformational and "BAU" Paradigms

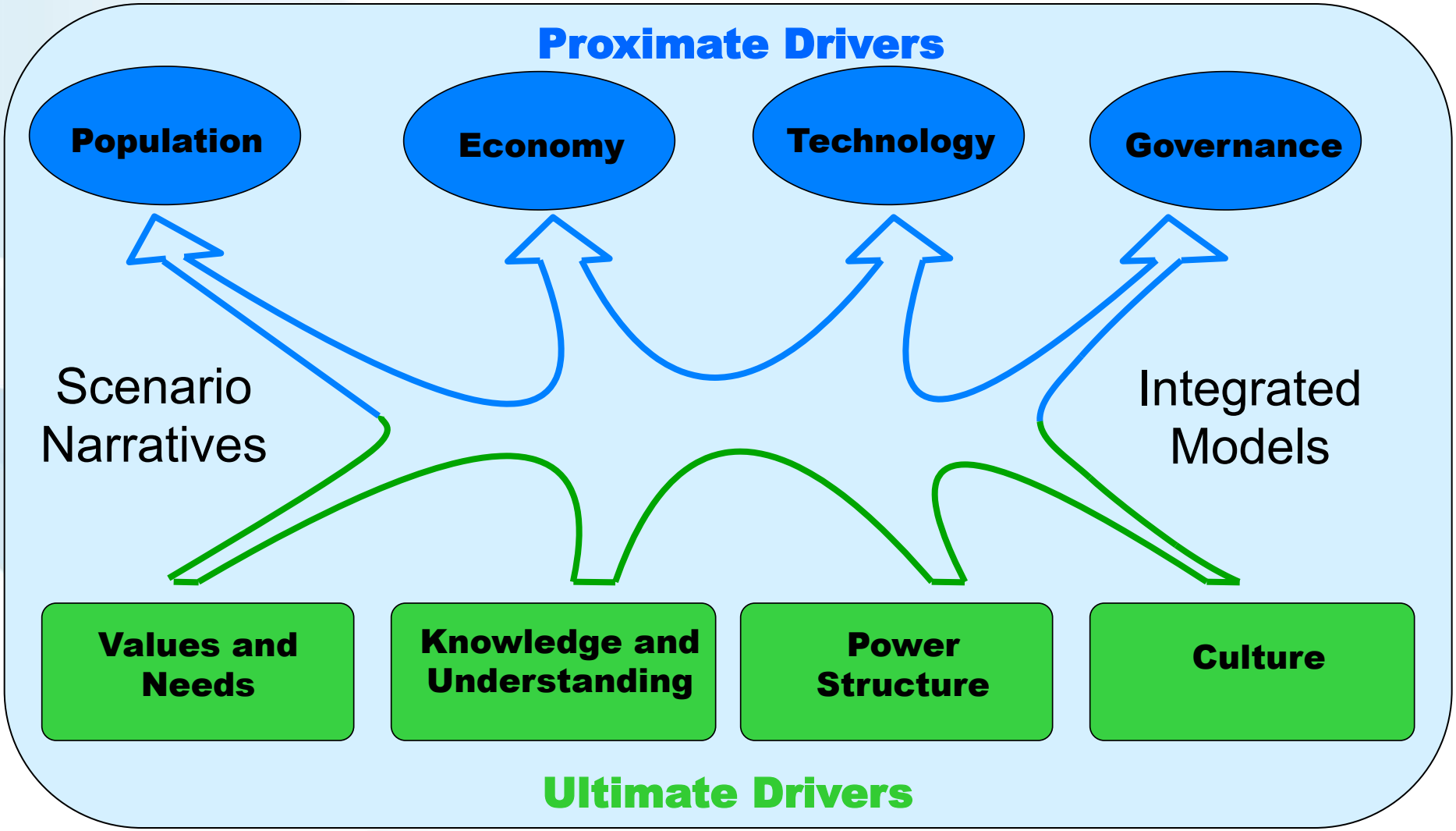


Source: WBGU, 2014

The World in 2050

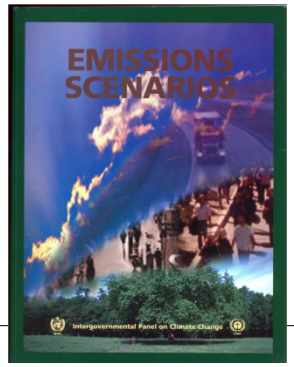
- How to secure global development within a safe and just operating space
- Planetary boundaries: e.g. Food; Water; Energy; Biodiversity; Climate Change
- “Safe Space” of interaction among SDGs: sustainability narratives to integrated models
- Transformational and BAU scenarios based on existing literature e.g. SSPs, GEA, DDPP
- Multiple-benefits of transformational pathways toward the “safe space” compared to BAU

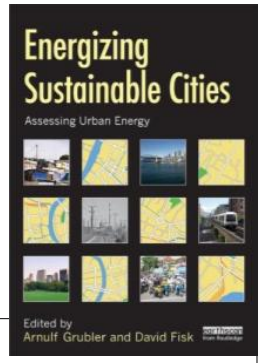
Possible Unified Analytical Approach

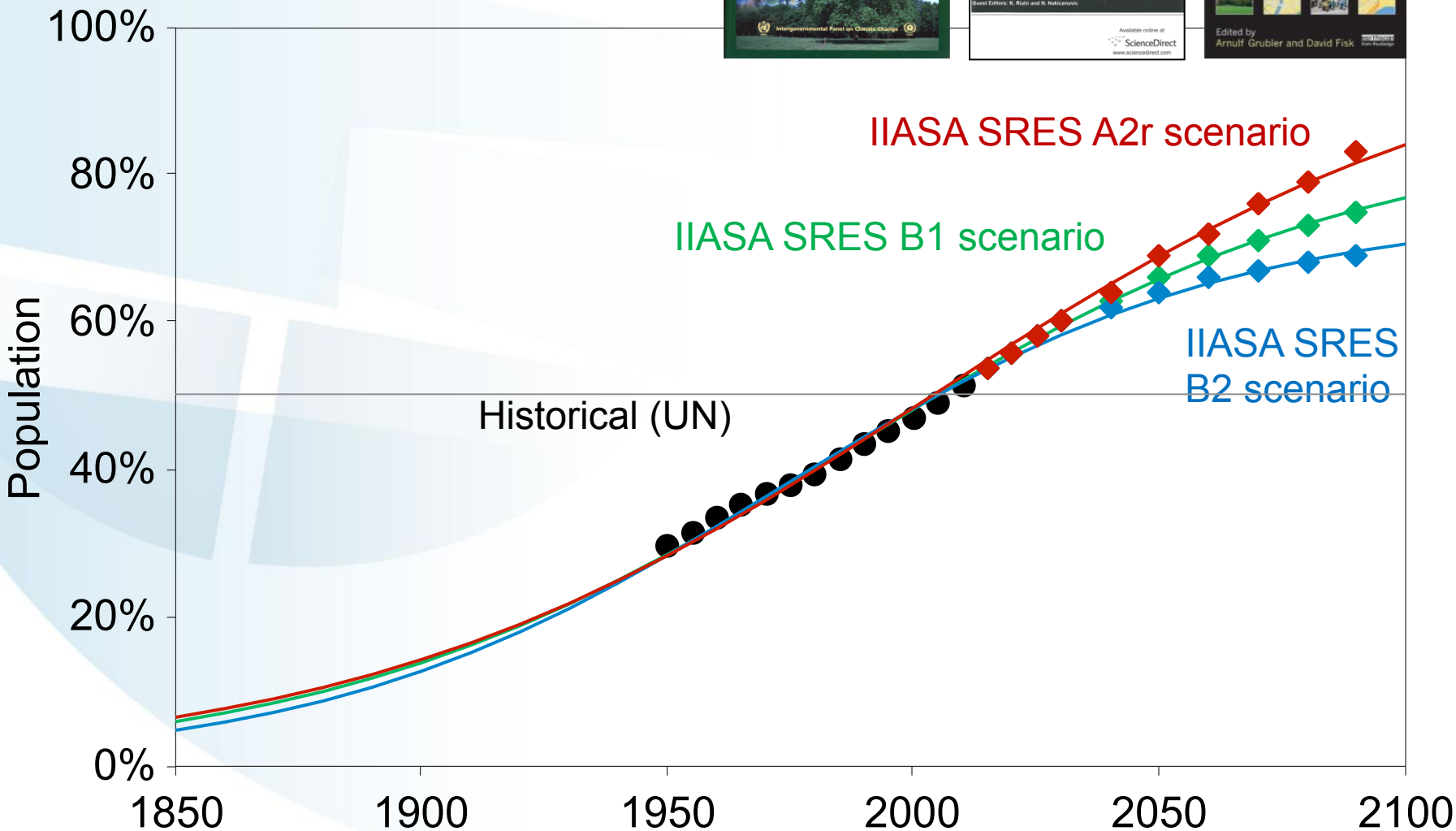


Source: Paul Raskin, 2002

Urbanization World

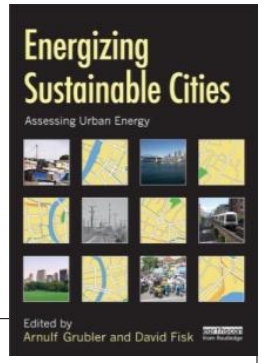


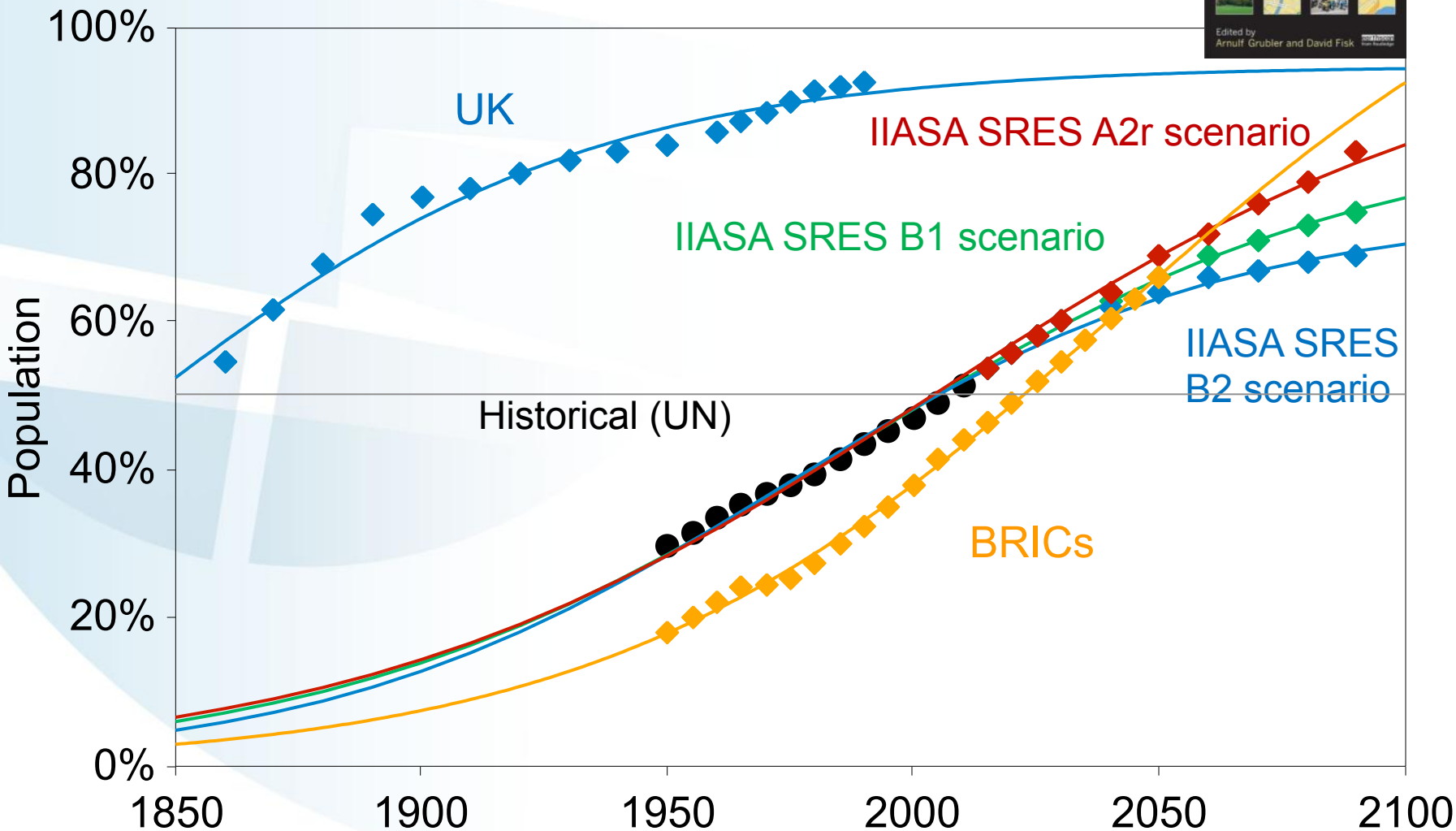




Source: Grubler et al. 2012

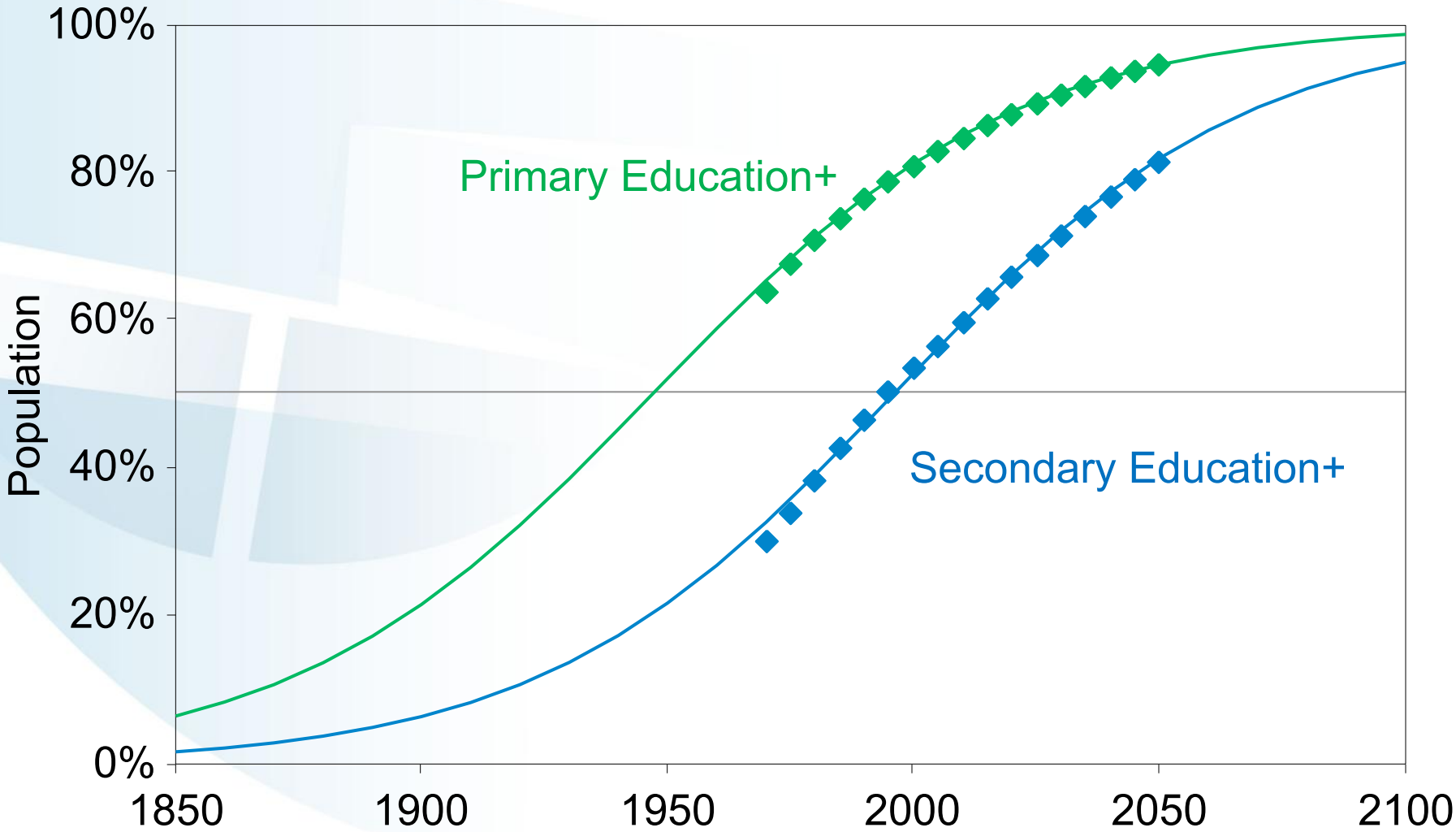
Urbanization World, UK, BRICs





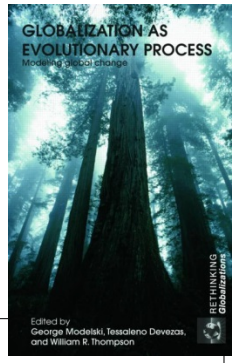
Source: Grubler et al. 2012

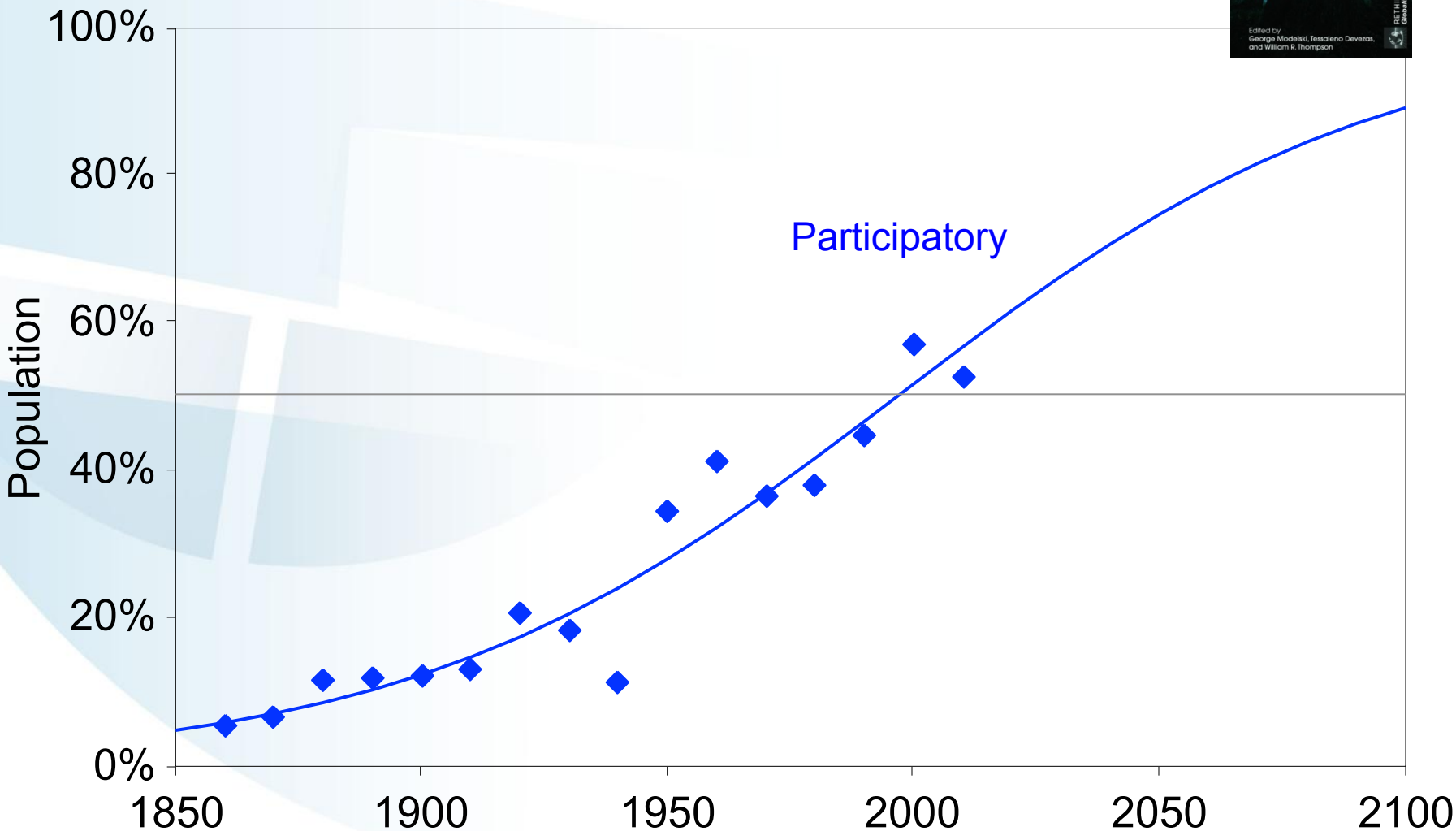
Global Educational Attainment



Source: Lutz et al., 2007

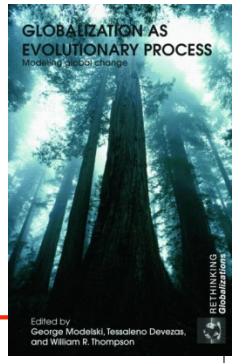
Participatory Governance

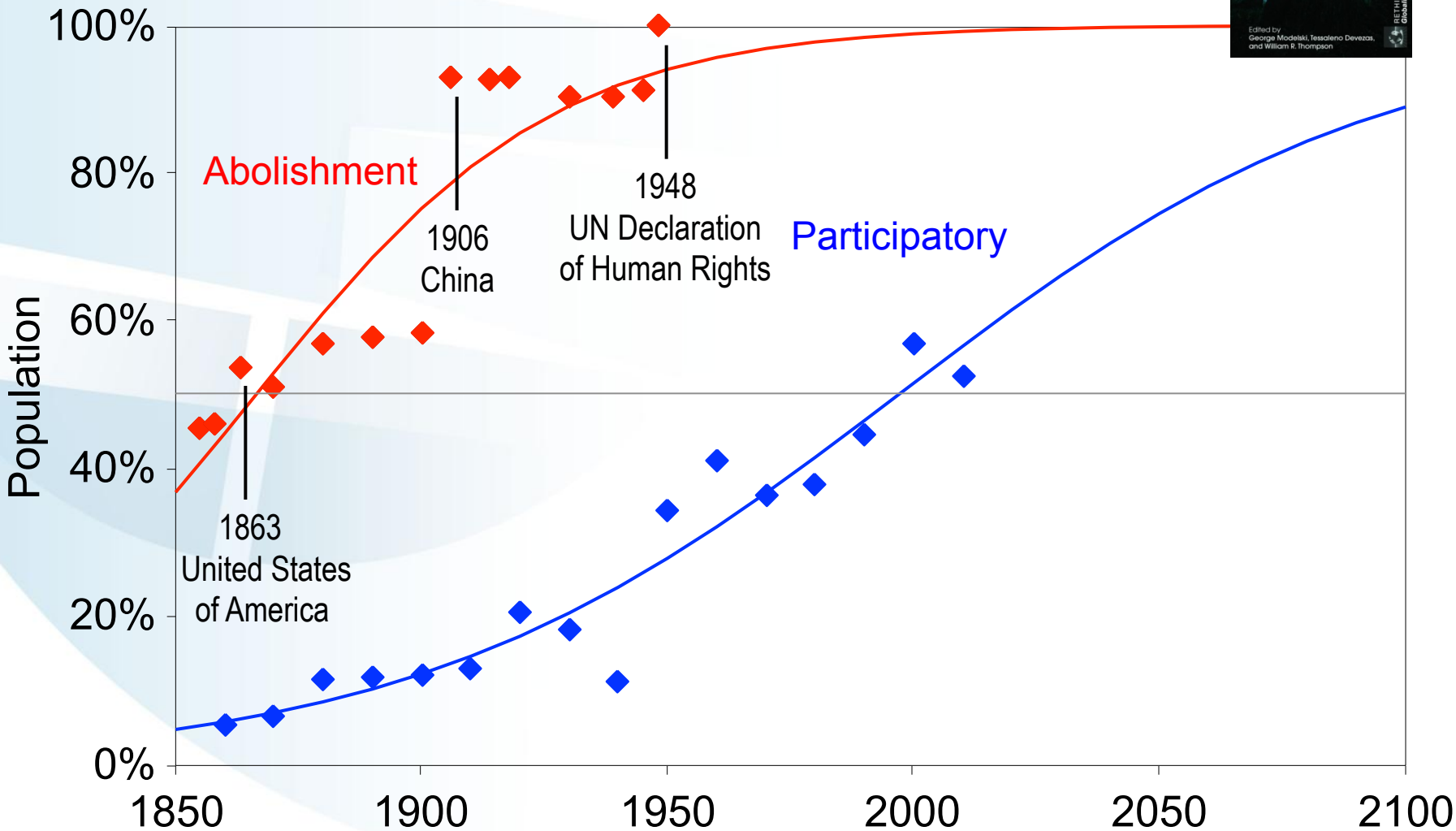




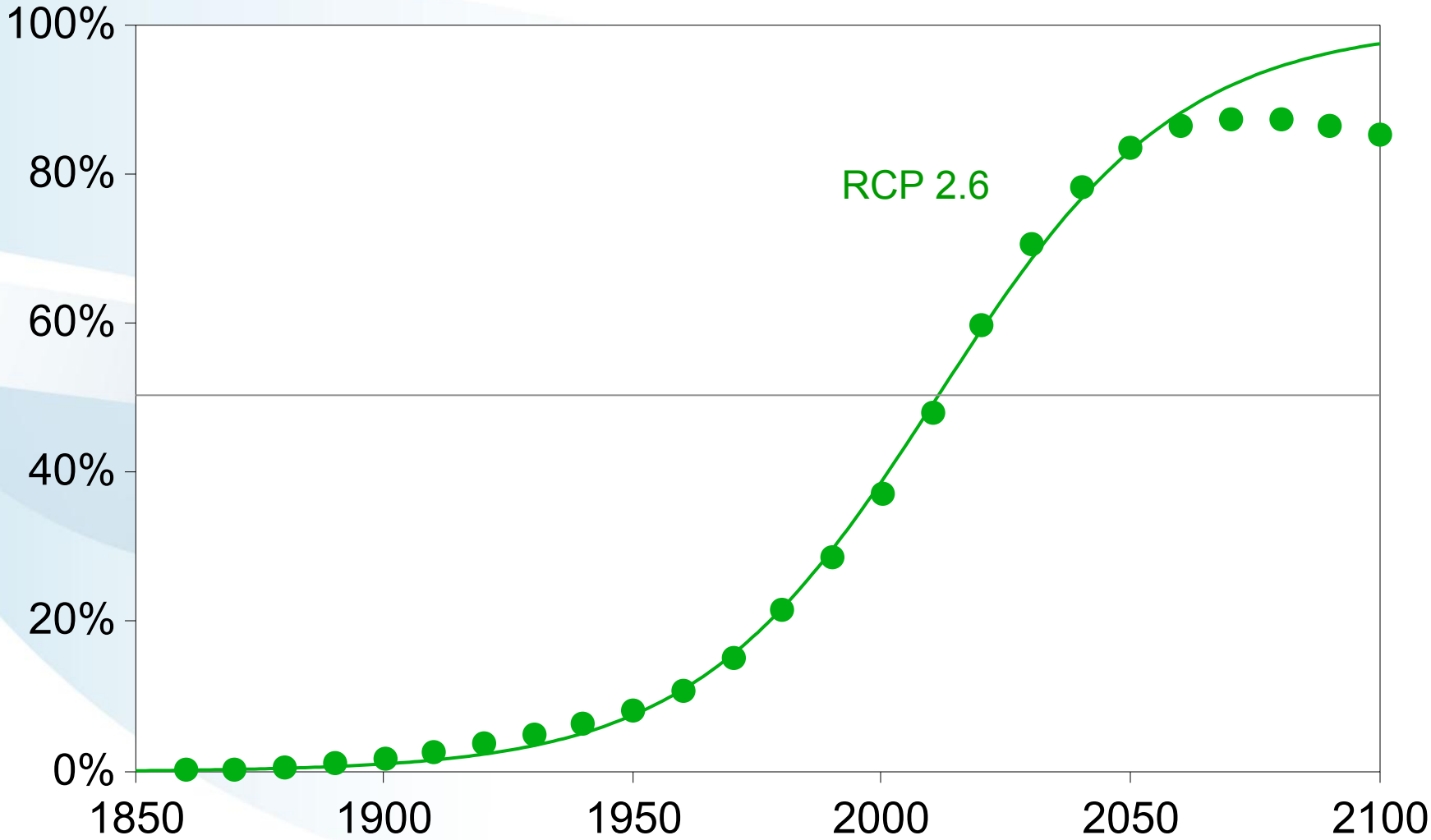
Source: Modelski & Perry, 2008; 2010

Participatory Governance Slavery Abolishment

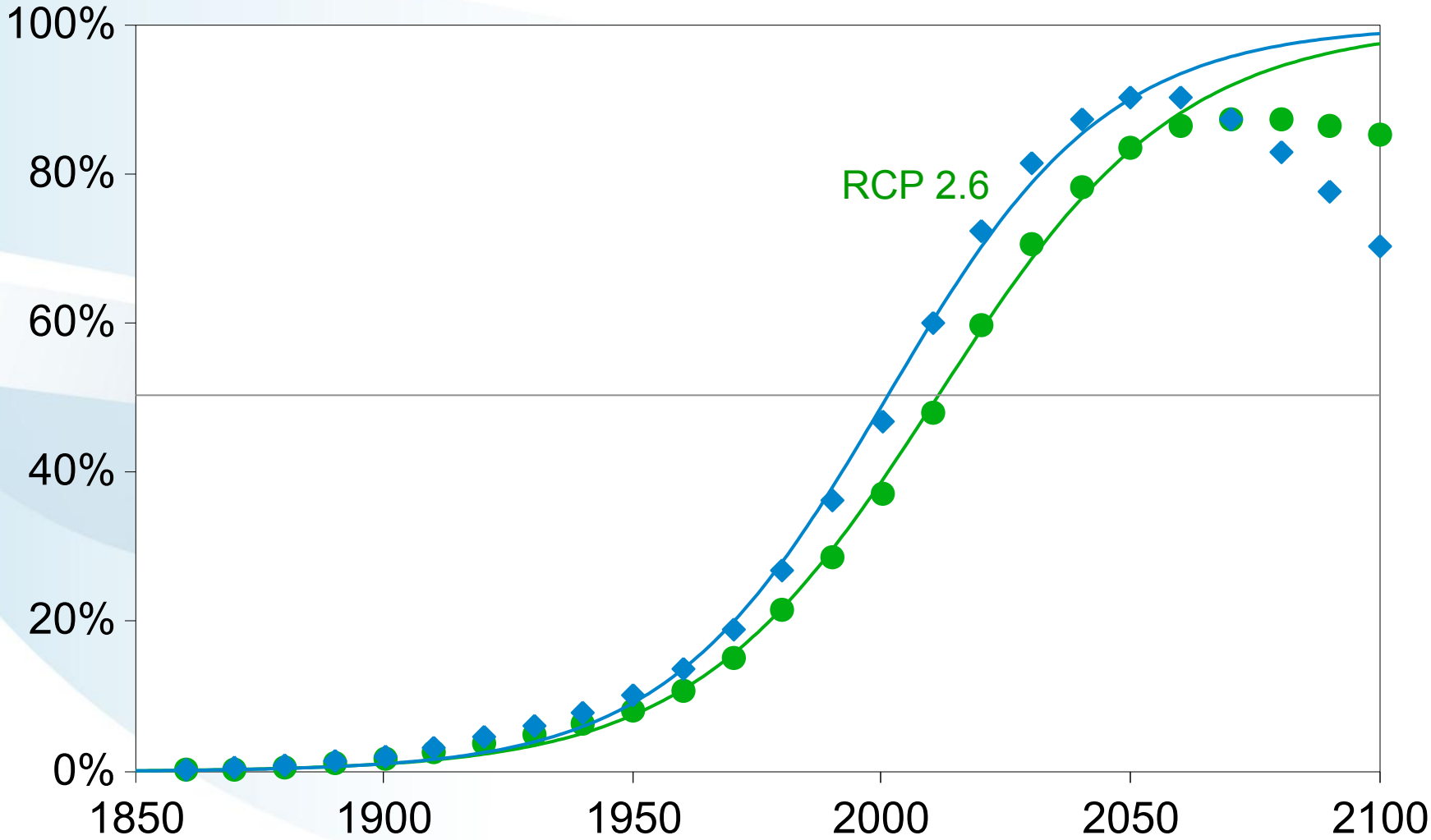




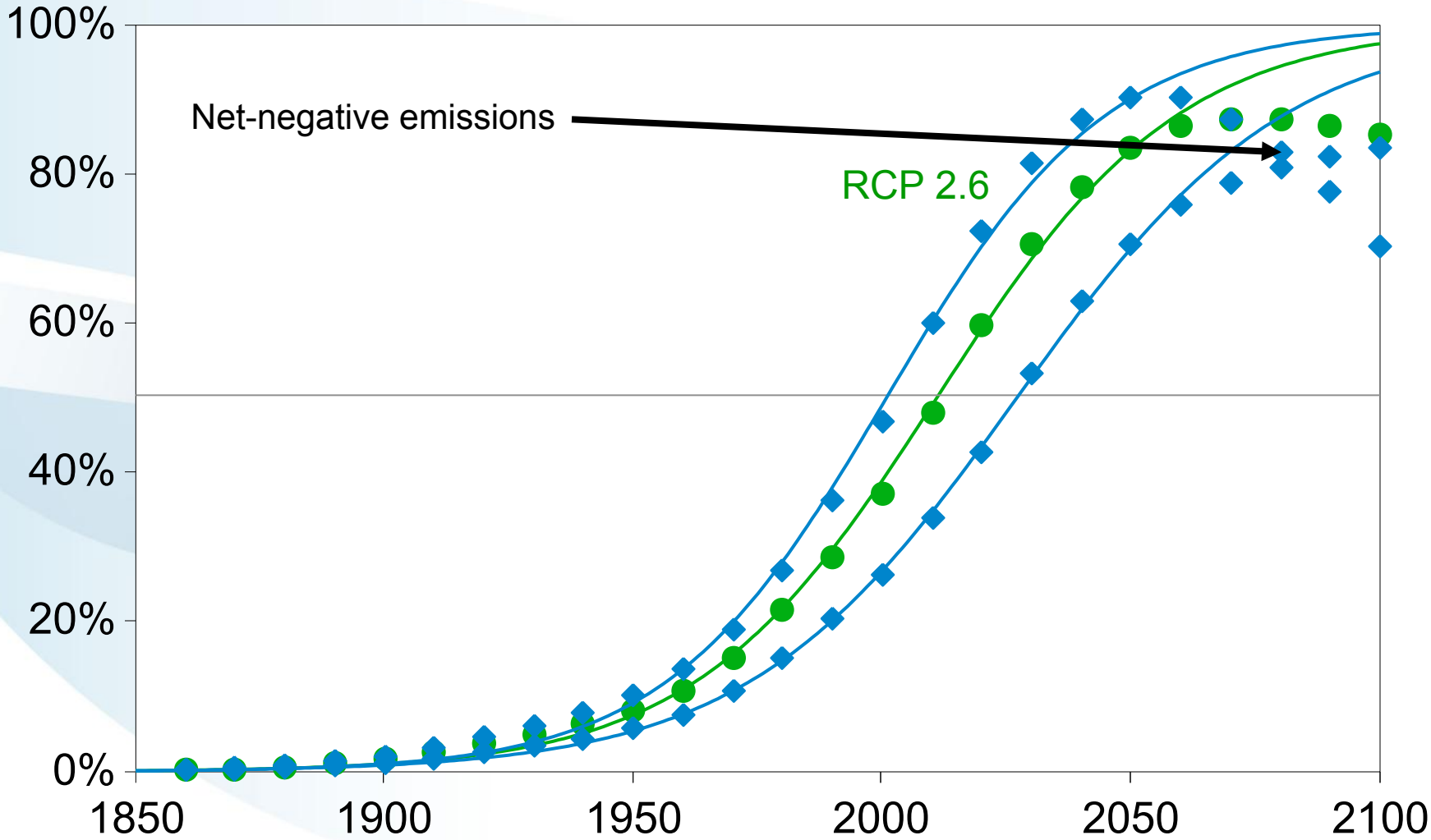
Cumulative Carbon Emissions



Cumulative Carbon Emissions

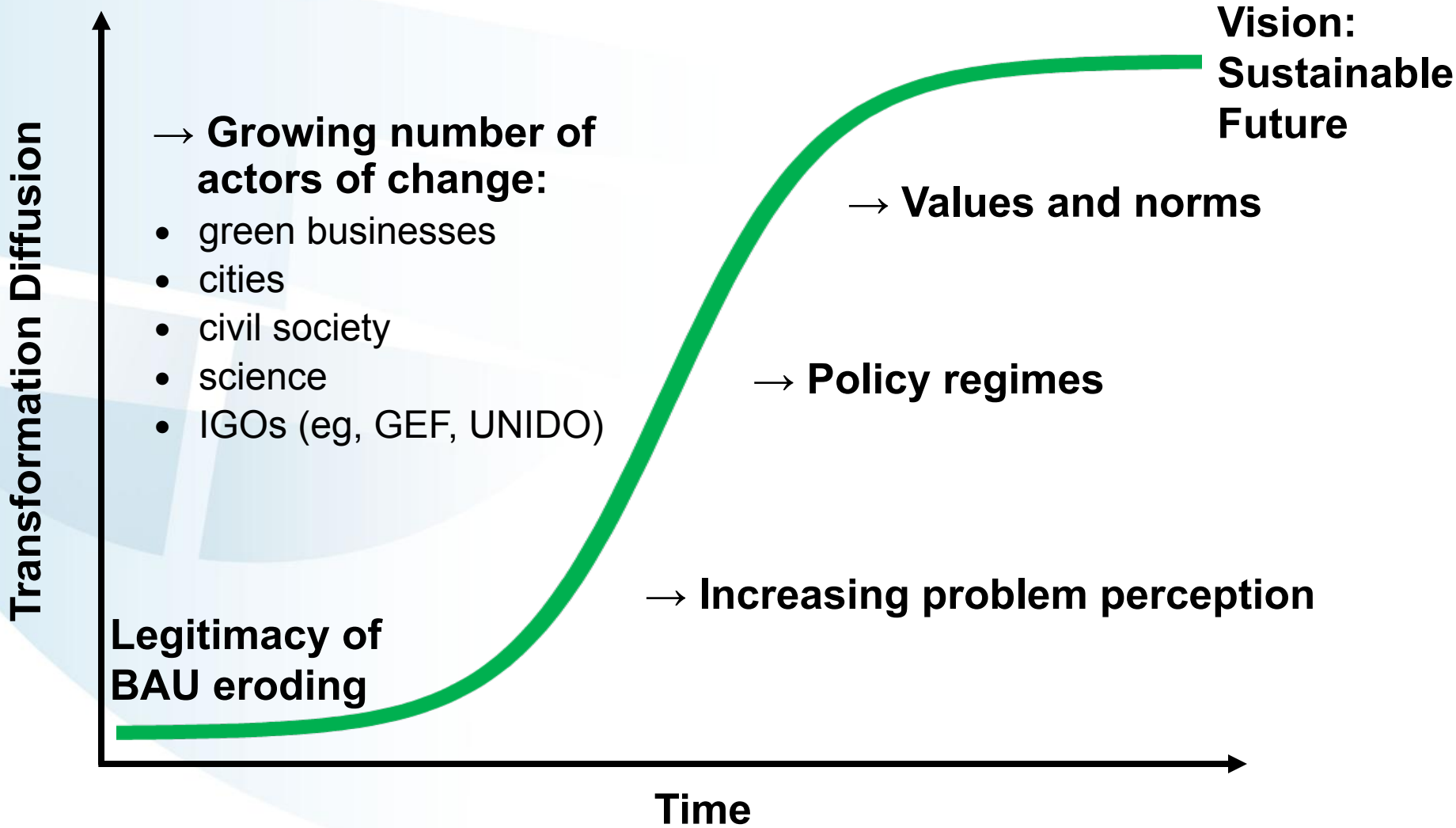


Cumulative Carbon Emissions

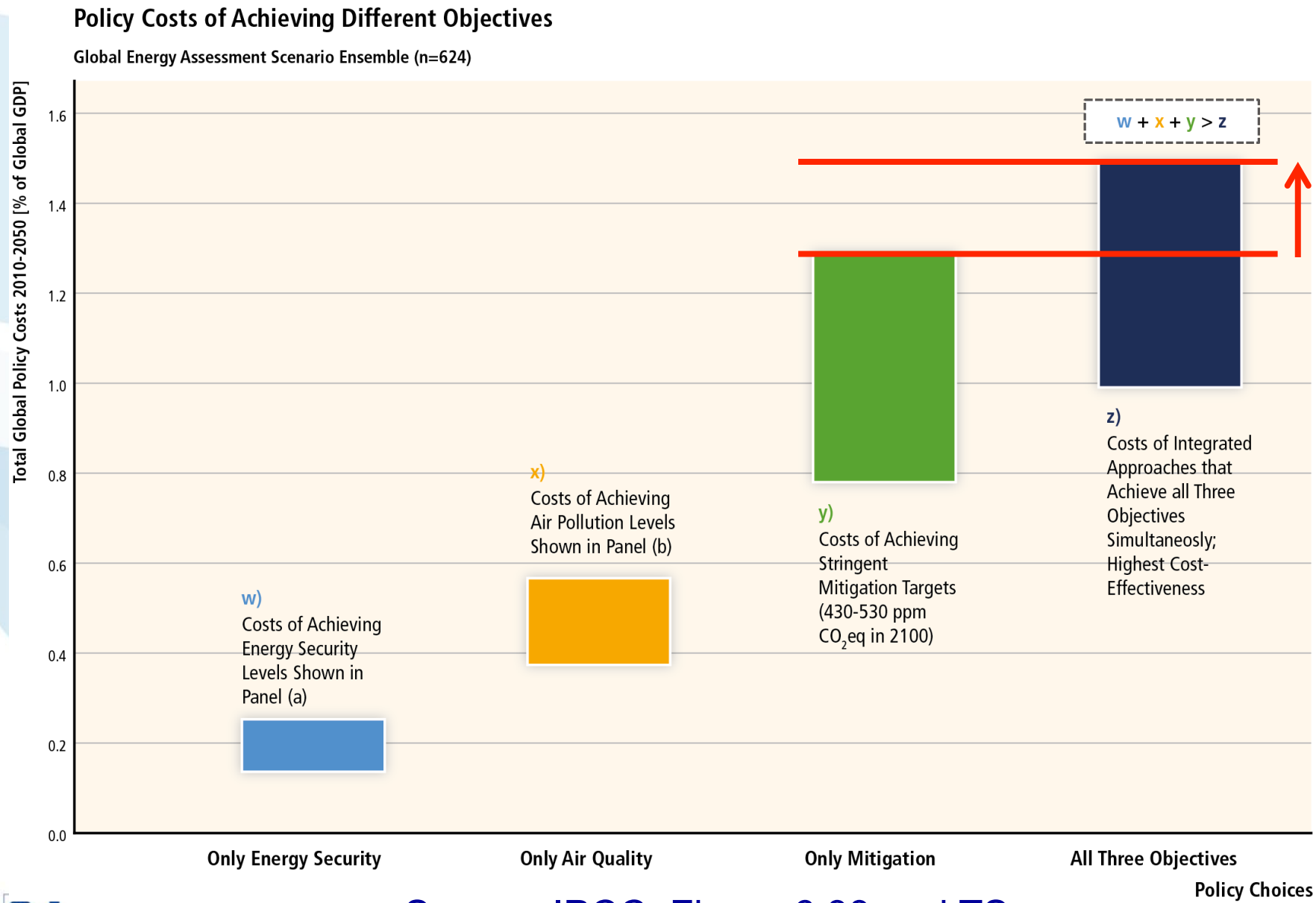


Sustainability Transformation

"Doing More with Less" within (Planetary) Boundaries

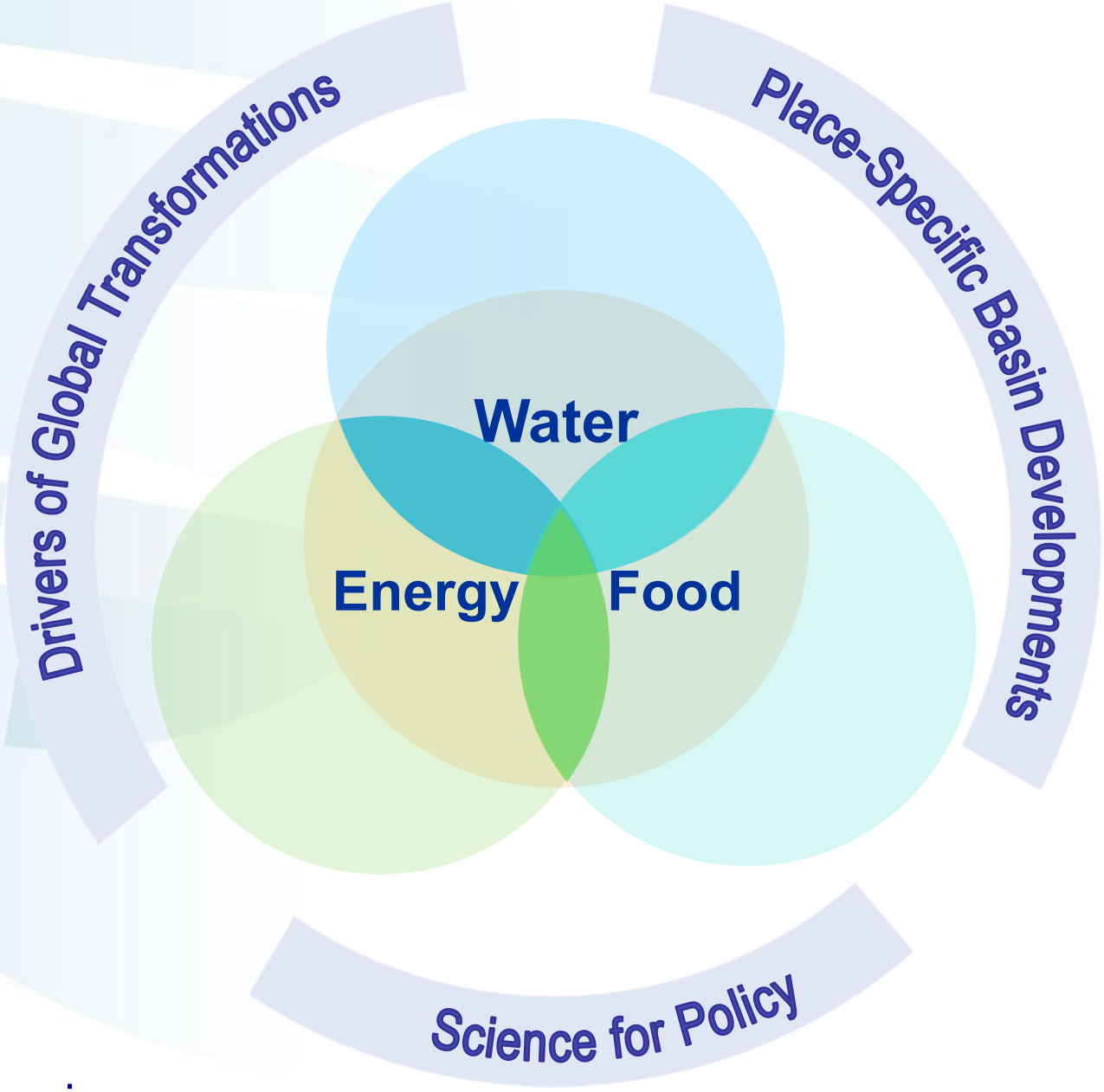


Co-benefits of GHG Mitigation



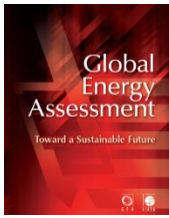
Source: IPCC, Figure 6.33 and TS

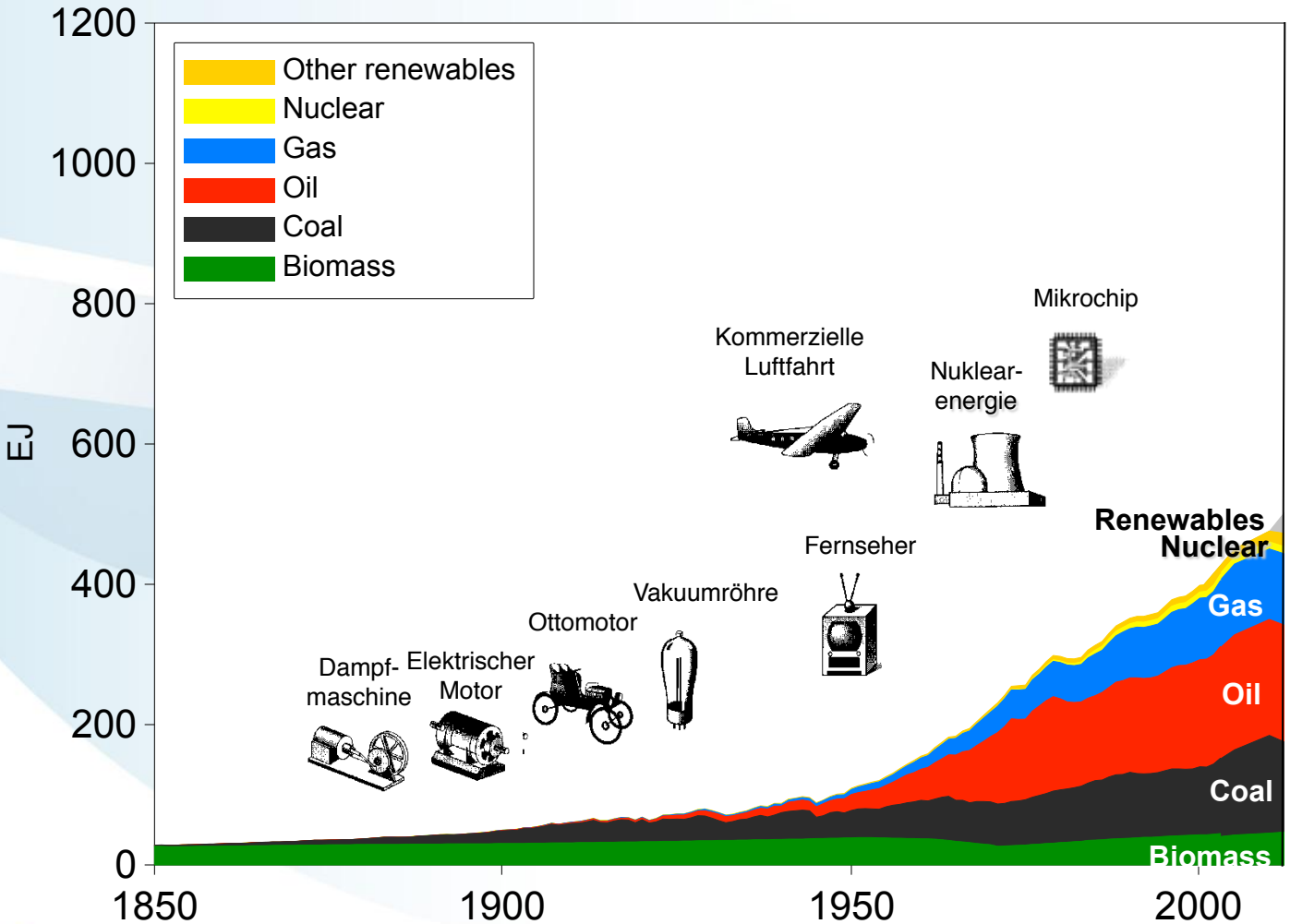
IIASA-GEF Nexus Research Partnership



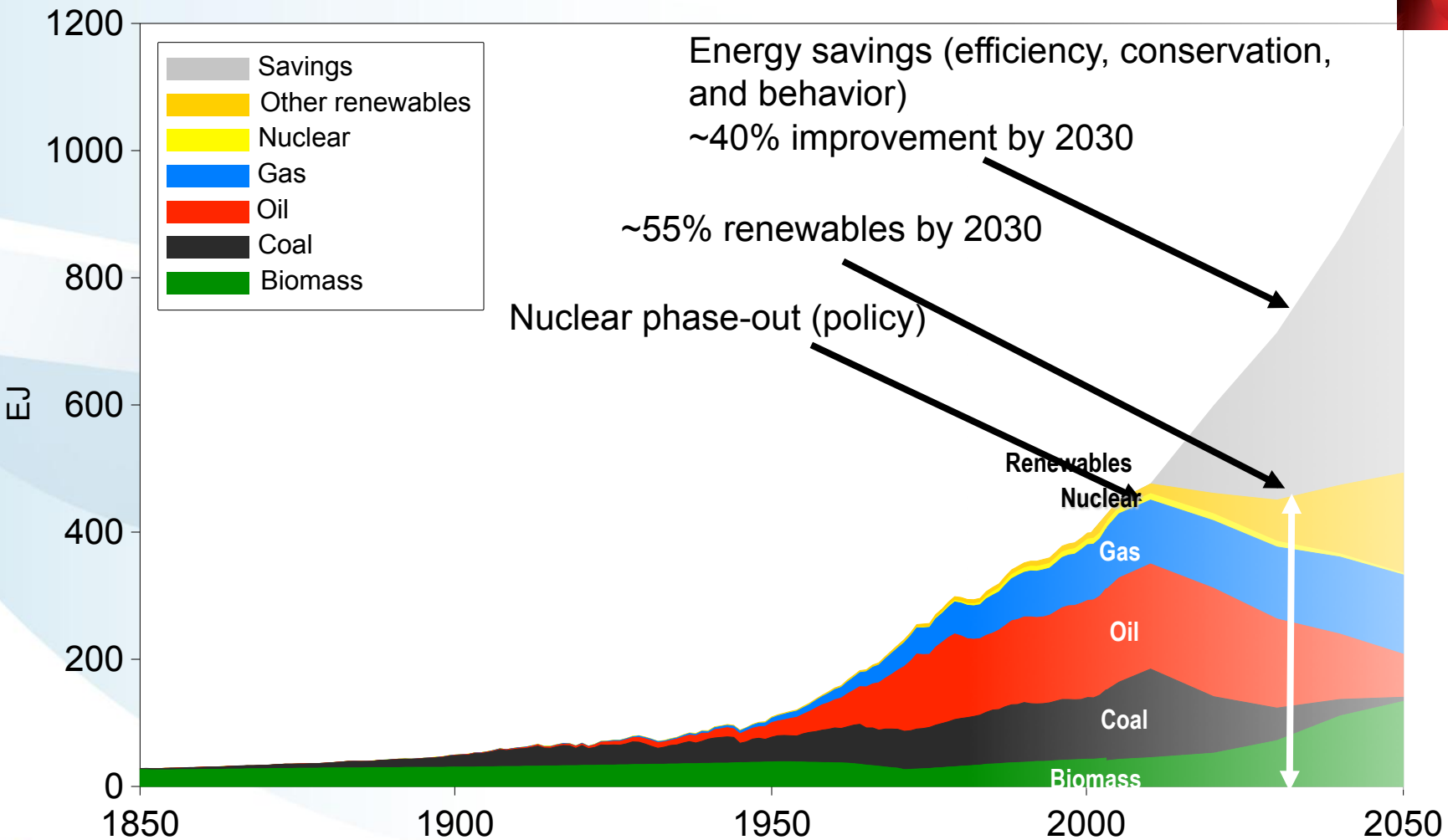
Global Primary Energy

Historical Evolution





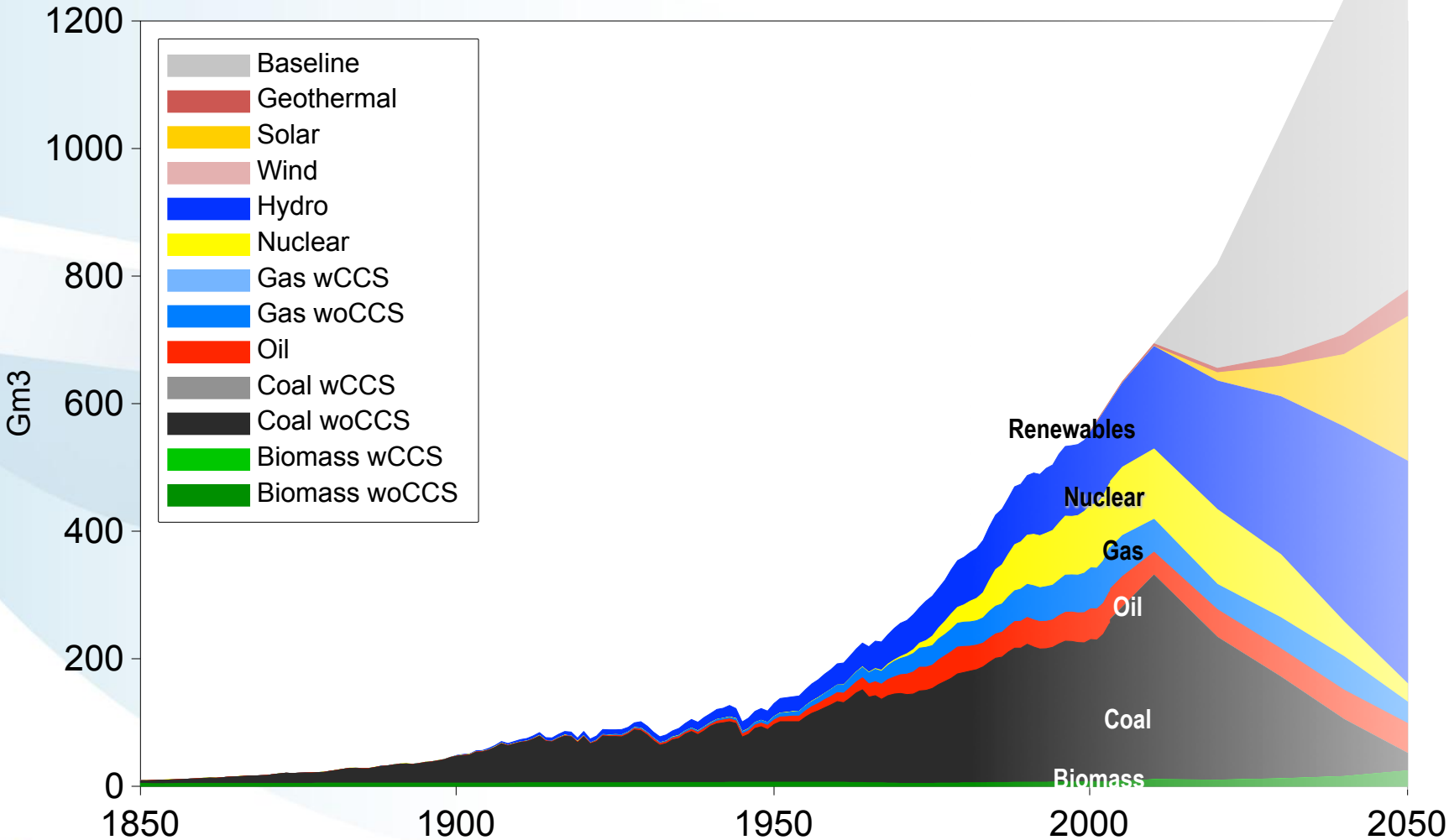
Global Primary Energy
no CCS, no Nuclear



Source: Riahi et al, 2012

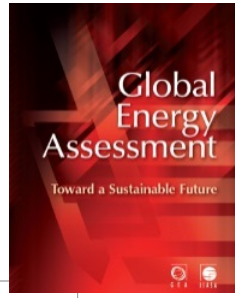
Global Water Withdrawals

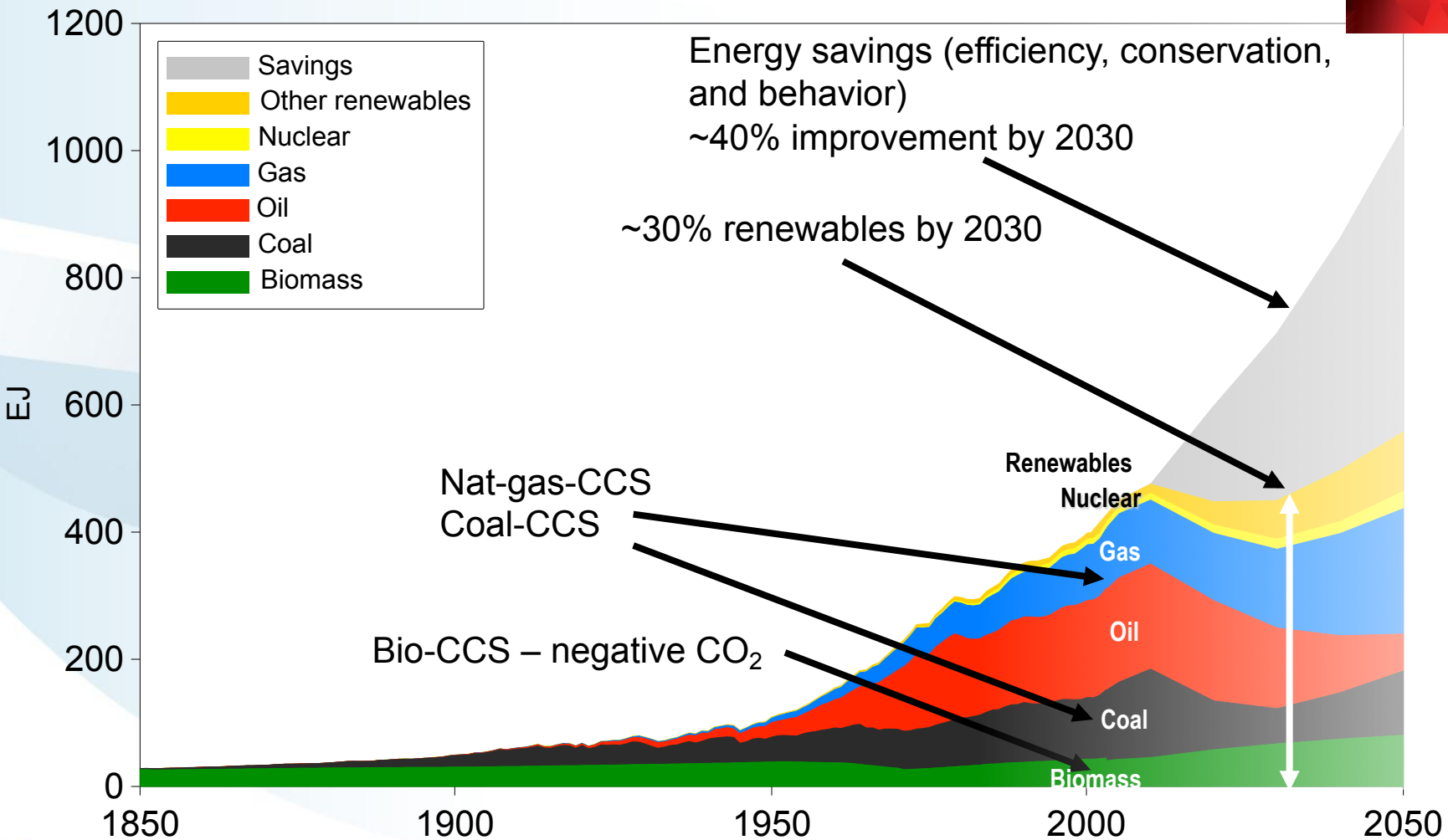
no CCS, no Nuclear



Source: Fricko et al, 2014

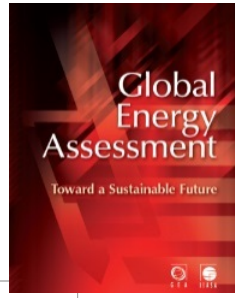
Global Primary Energy
A Transformational Pathway

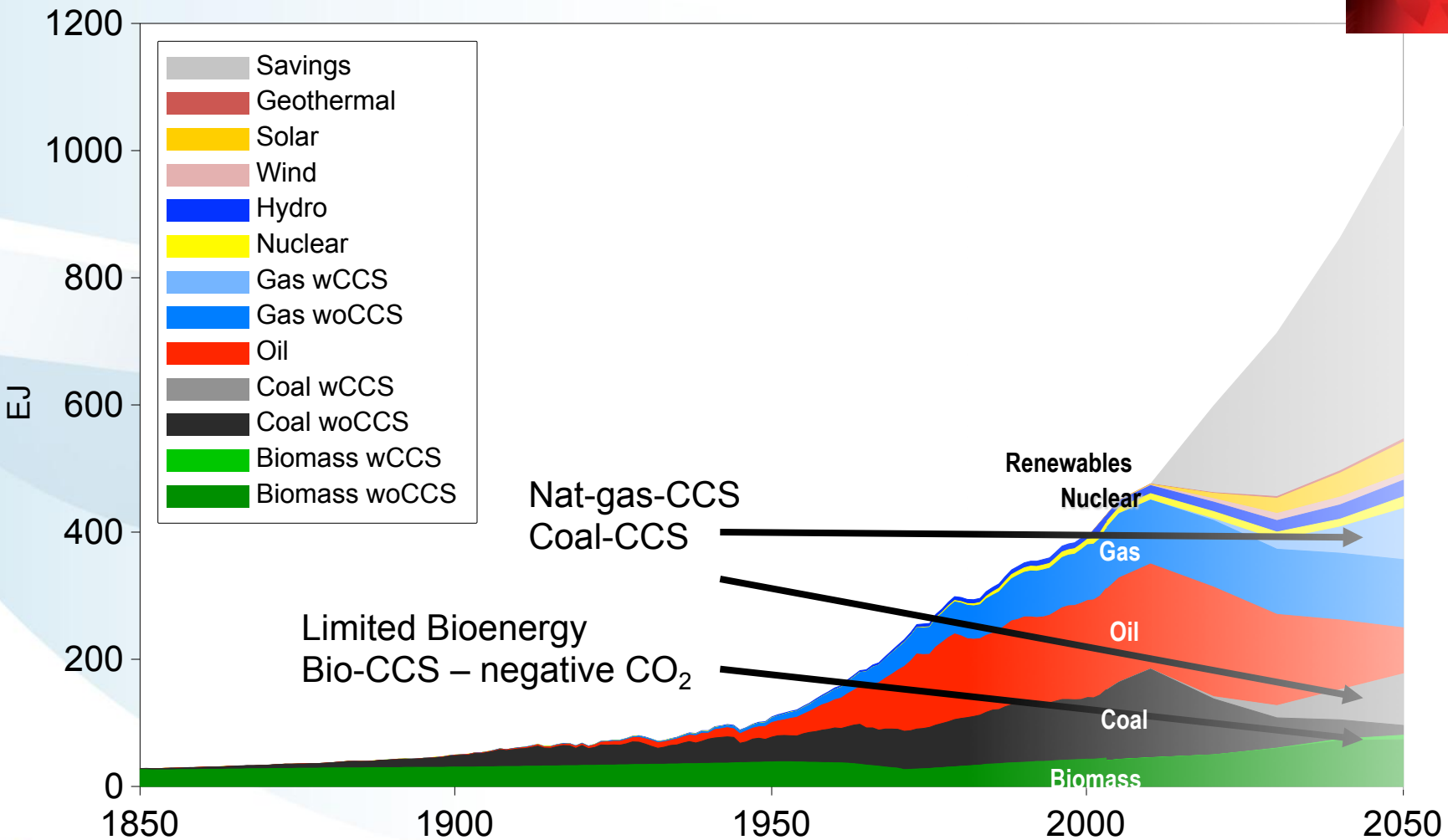




Source: Riahi et al, 2012

Global Primary Energy
A Transformational Pathway

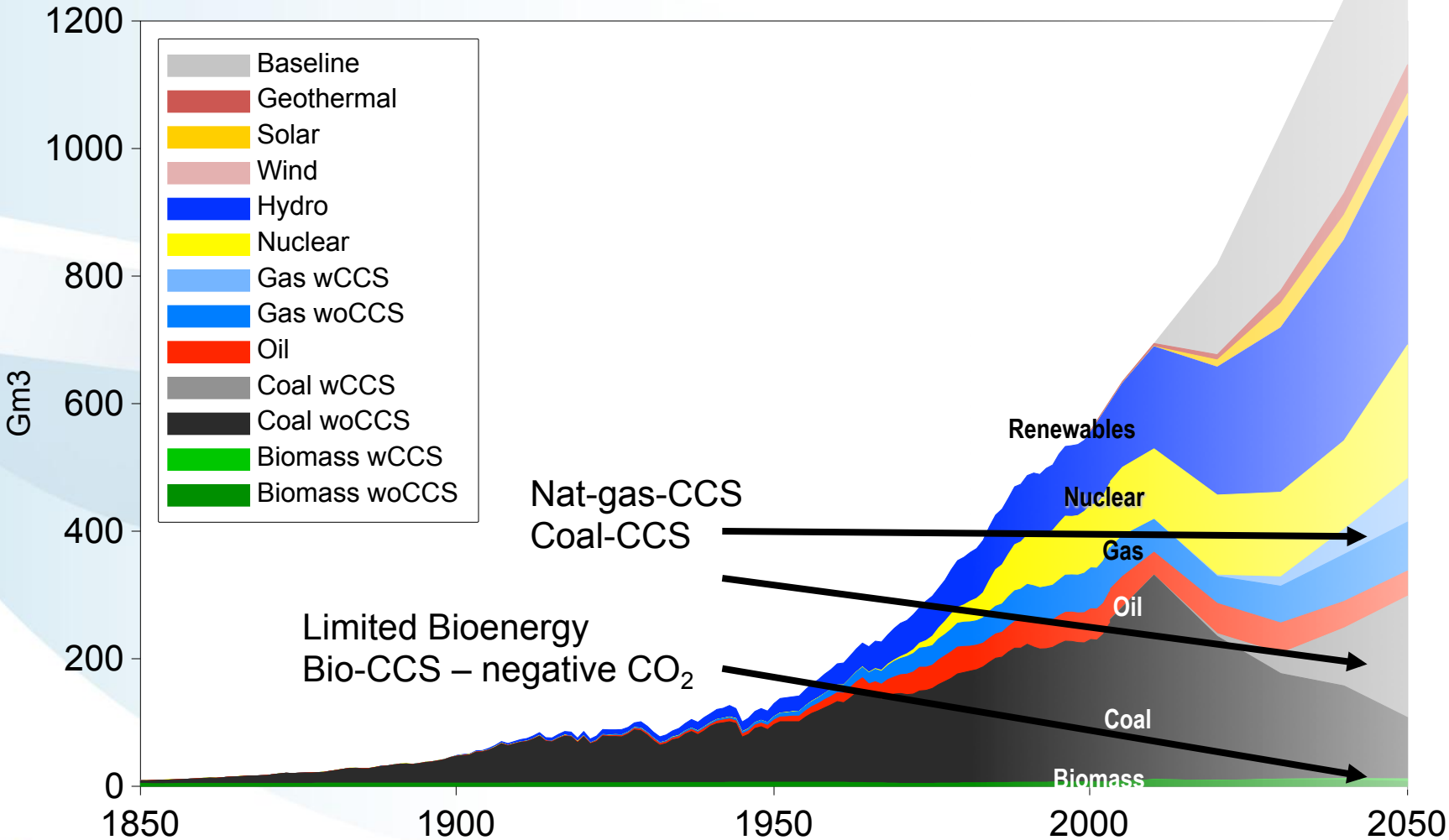




Source: Riahi et al, 2012

Global Water Withdrawals

A Transformational Pathway



Source: Fricko et al, 2014

Science for Transformation

- **Better integration across science communities**

  "Climate or development first" approach too narrow
- **More integrated & holistic assessment of climate change policy in the context of other priorities:**
  - **Multi-objective & multi-policy framing to better understand climate policy tradeoffs & benefits**
  - **"Nexus" approaches to reach multiple objectives simultaneously: energy, water, food & urbanization**
- **Challenges are huge:**
  - **Different constraints and priorities across scales**
  - **Normative goals involved in policy prioritization**

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

THANK YOU

science for global insight

naki@iiasa.ac.at