Reflections on Green Transition

Atle Midttun

Sept. 2014

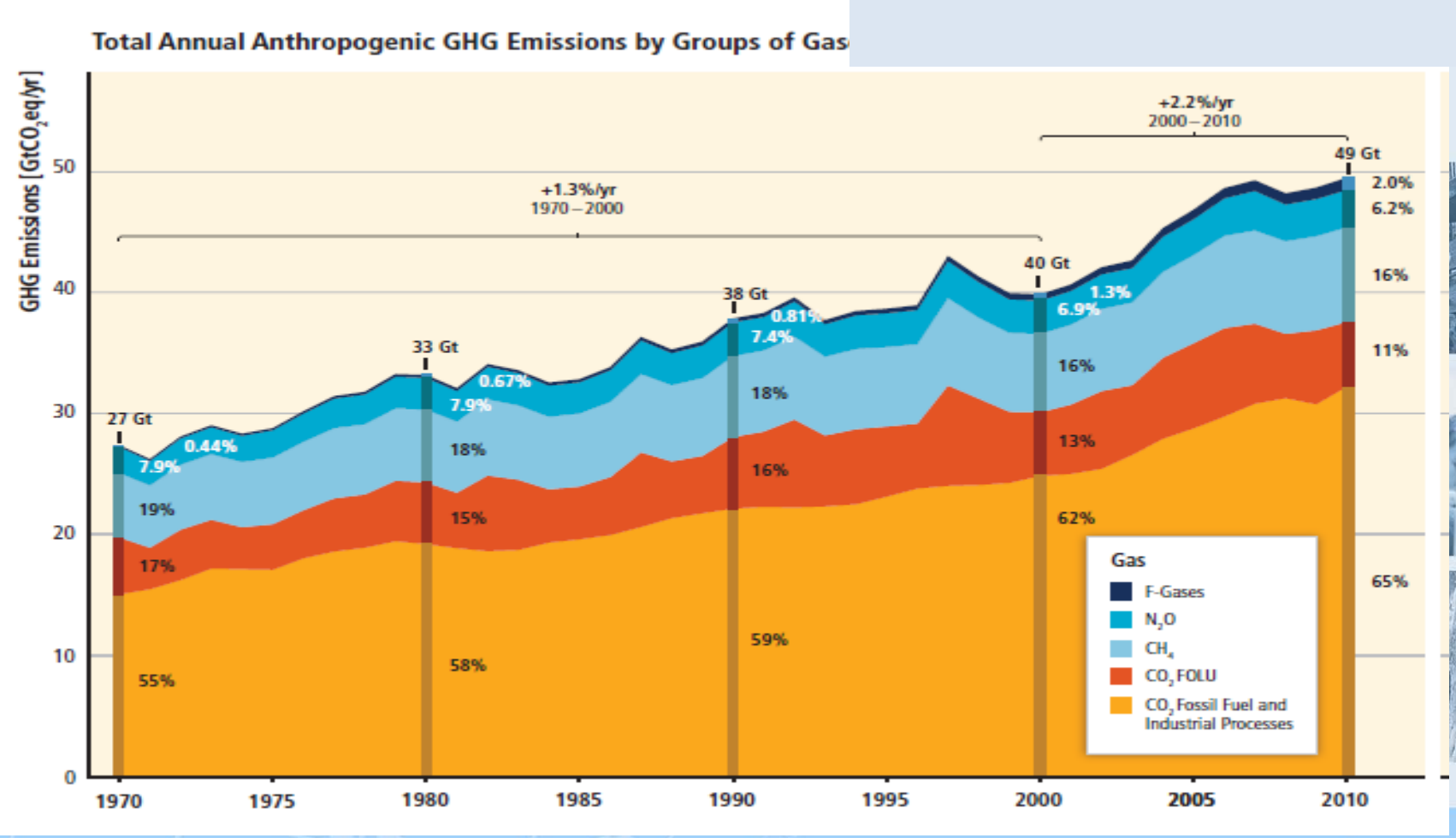
Salzburg Energy Seminar

Optimism about mature economies

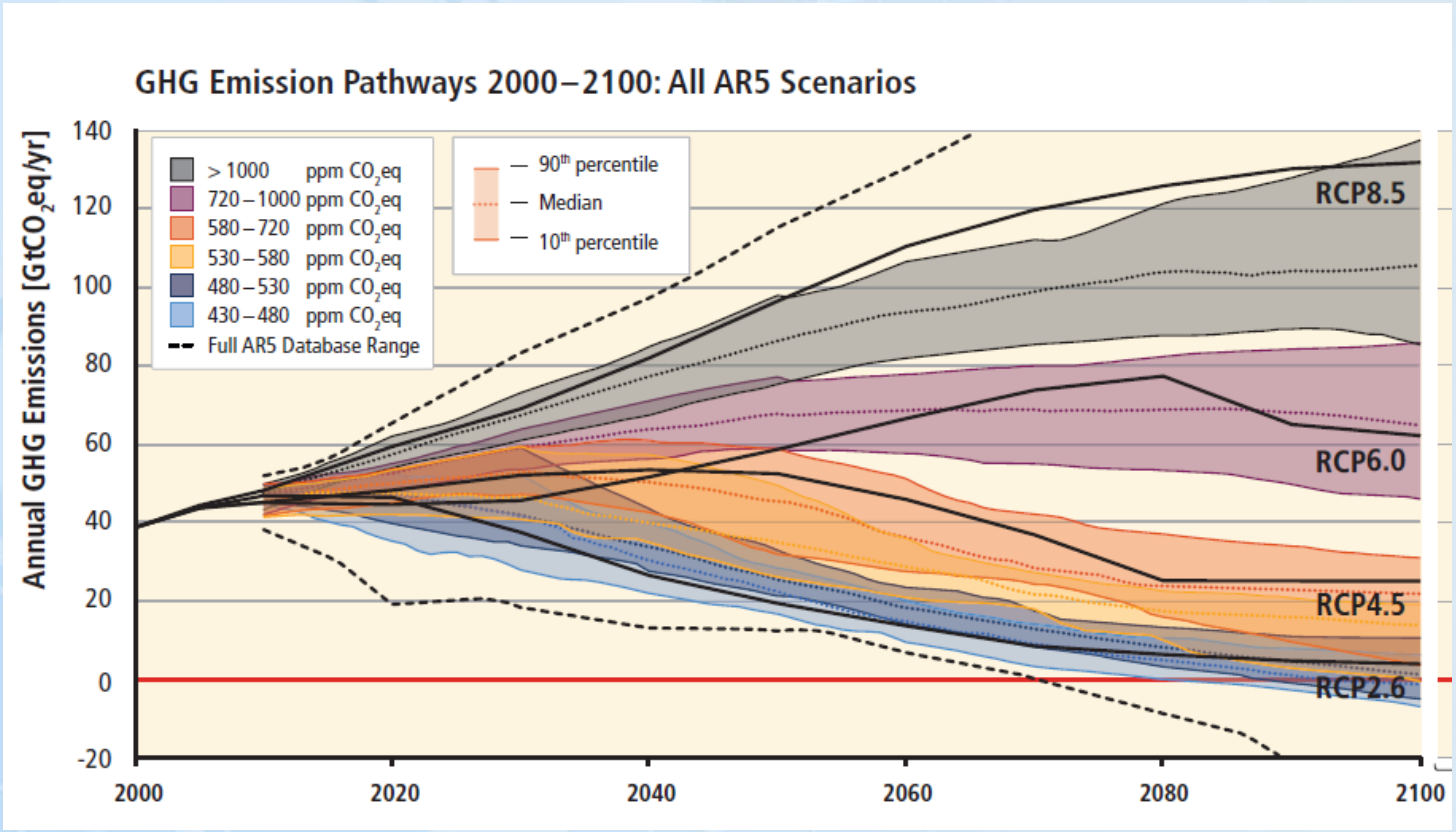
- Chris Huhne former Secretary of Energy UK (Liberal Party) (Guardian 25 August)
- We are growing richer while using less energy
- Many green thinkers suspicious of growth
- Today you can have both, no need for «green puritanism»

- Technology now allows us to increse growth and highten living standards without increasing emissions.
  - Cars are far more efficient
  - We are taking the train more
  - Lighting has increased tremendously in energy efficiency – LED light saves electricity by 93%
- Our living standards are rising, while our energy use is not.

IPCC Pessimism



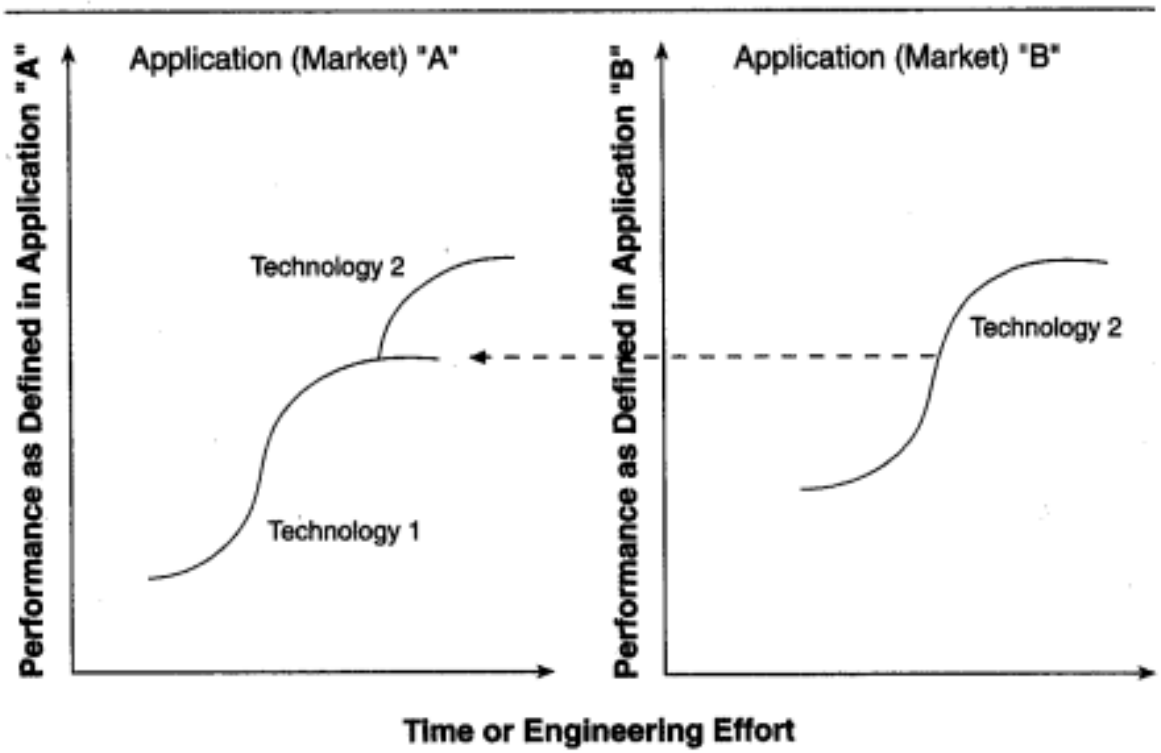
IPCC Pessimism ctd.



I Equilibrium versus Creative Destruction

The challenge of Managing Disruptive Technologies

Clayton Christensen, 1992



Source: Clayton M. Christensen, "Exploring the Limits of the Technology S-Curve. Part I: Component Technologies," *Production and Operations Management* 1, no. 4 (Fall 1992): 361. Reprinted by permission.

Business Transformation

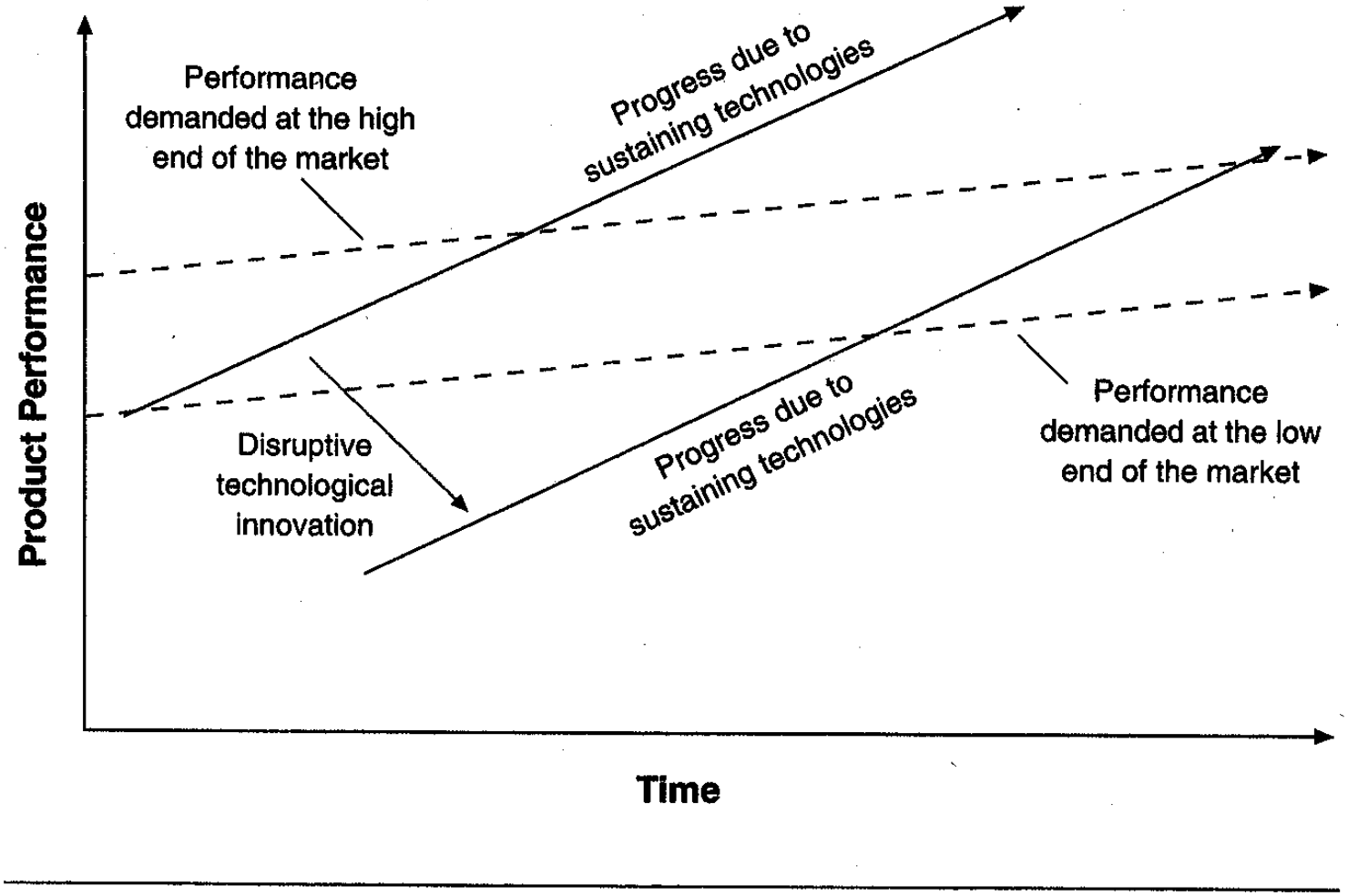
How Broad?	Incremental	Radical
Industry	B2B and supply chain integration	Inventing new industry structures
Business	Re-engineering business processes	Creating entirely new business concepts
Product/ process	Refining product & processes	Reconfiguring Products & processes

How radical?

From: Gary Hammel

Sustaining (ST) versus disruptive technologies (DT)

Figure I.1 The Impact of Sustaining and Disruptive Technological Change



Incremental innovation

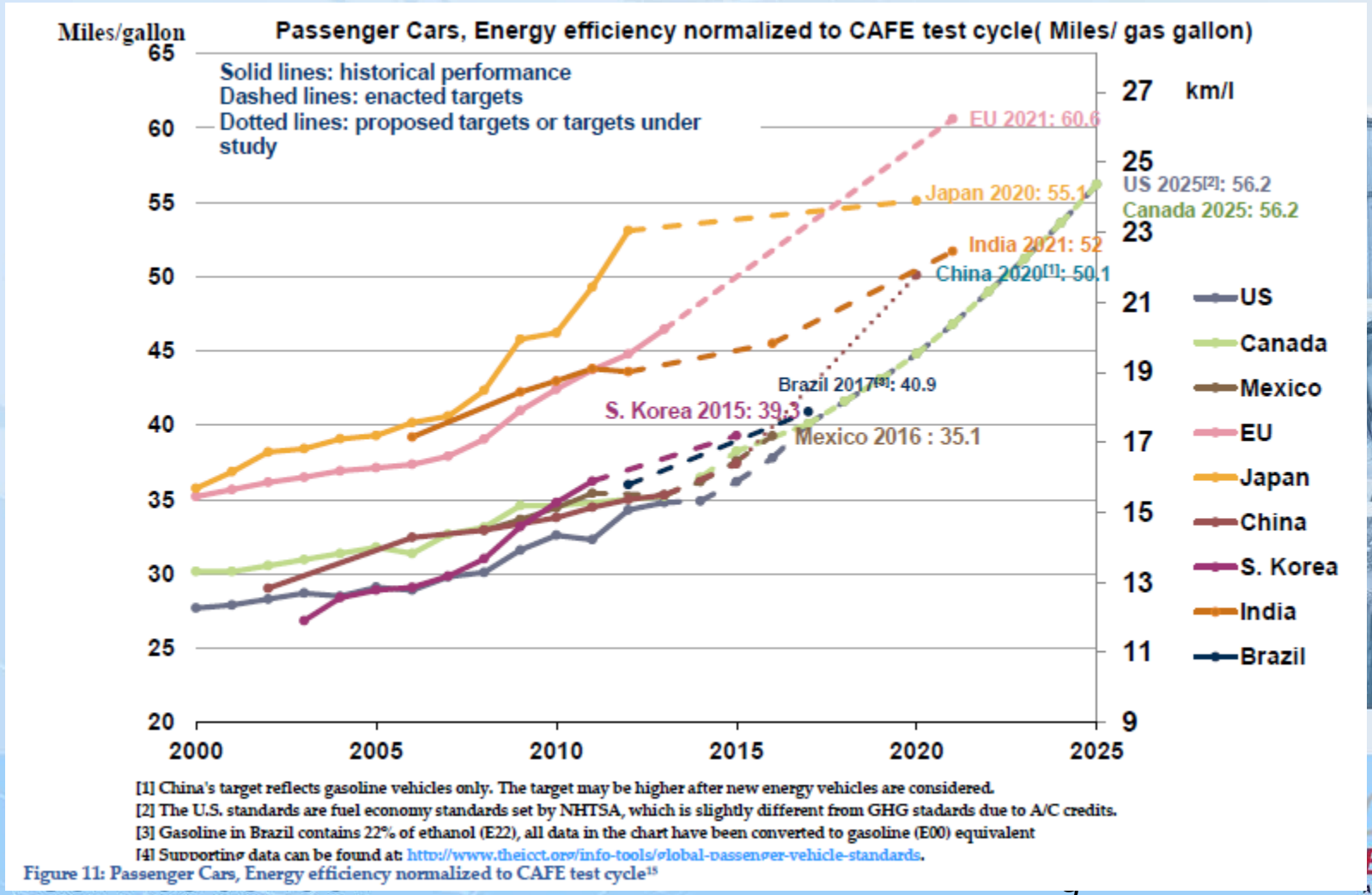
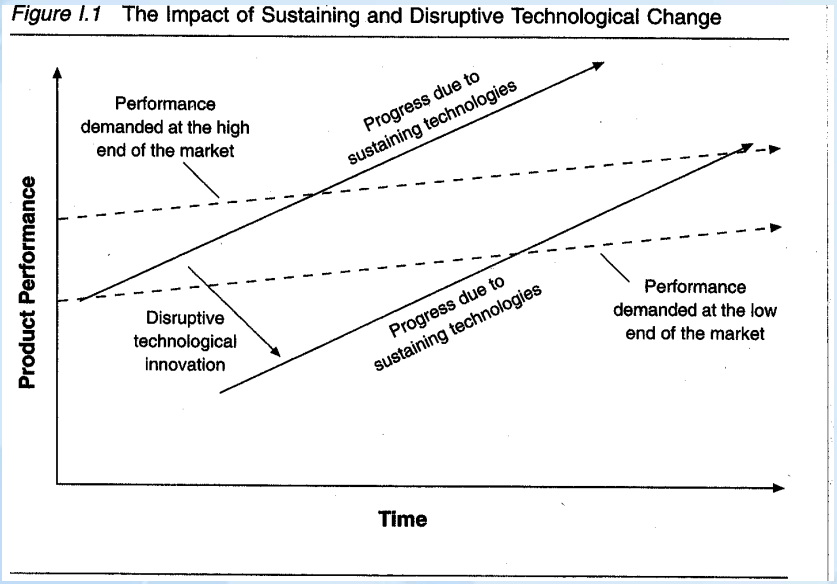


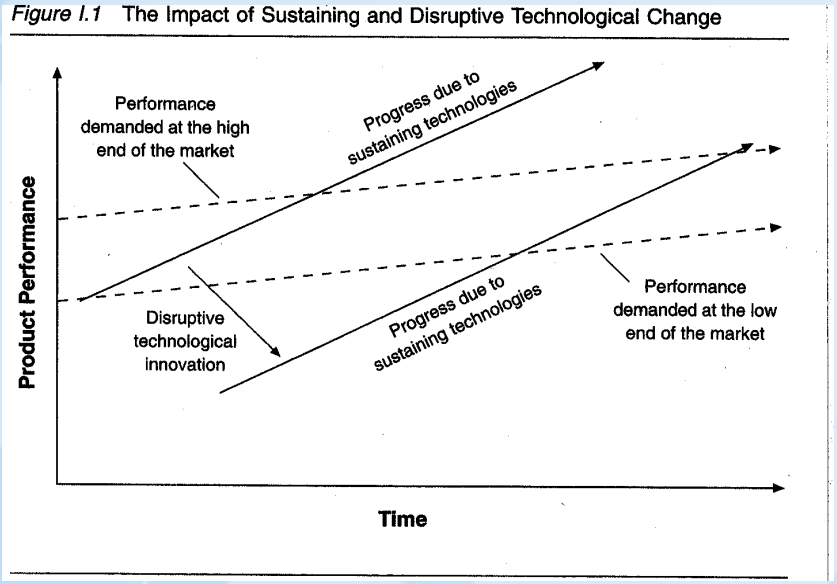
Figure 11: Passenger Cars, Energy efficiency normalized to CAFE test cycle[15]

Sustaining versus disruptive technologies



The Innovation may demand significant changes by not only the consumer, but also the infrastructure.

Sustaining versus disruptive technologies



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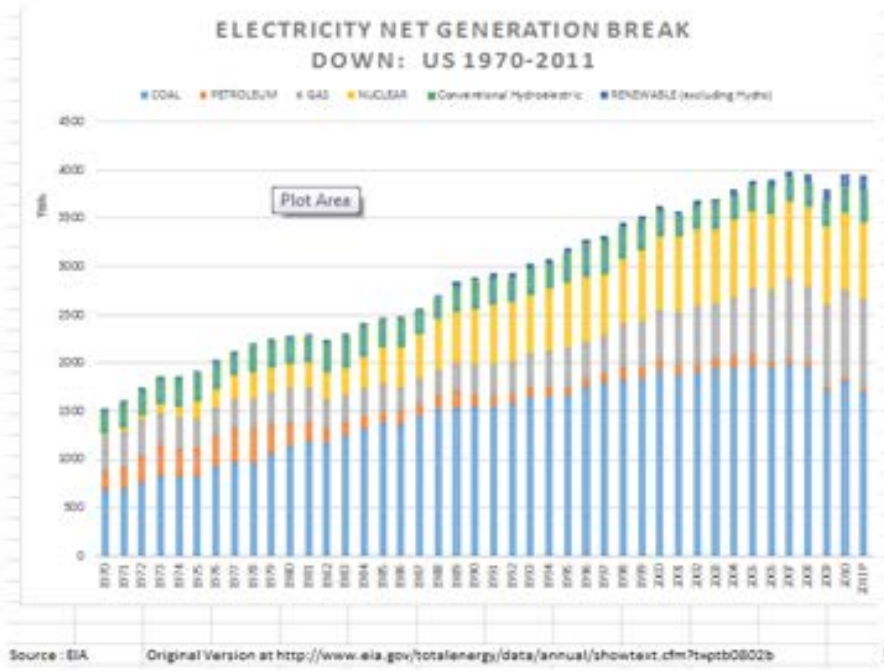
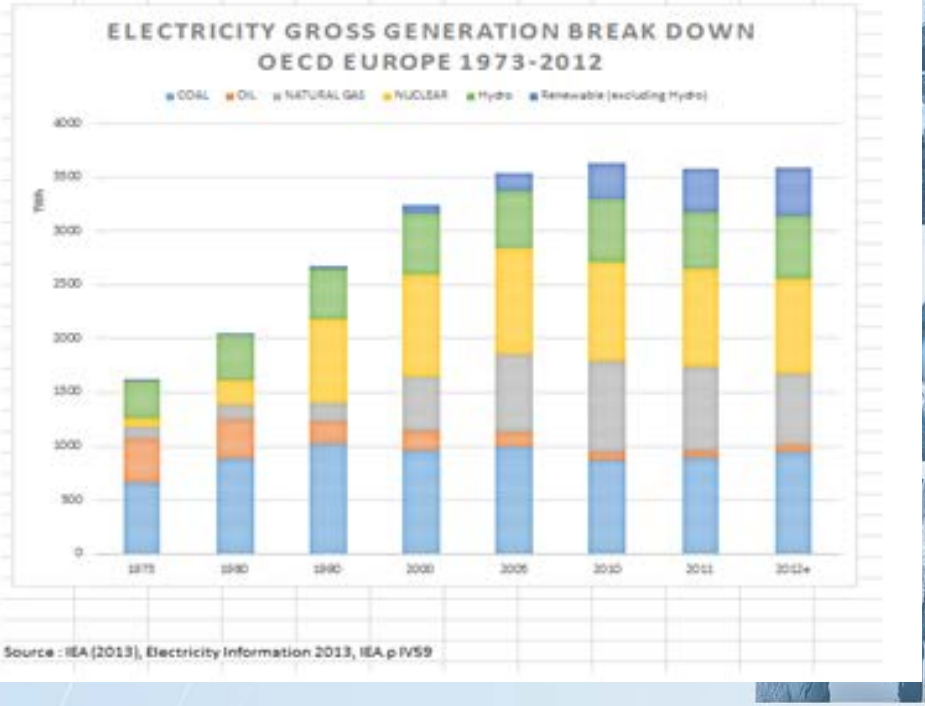
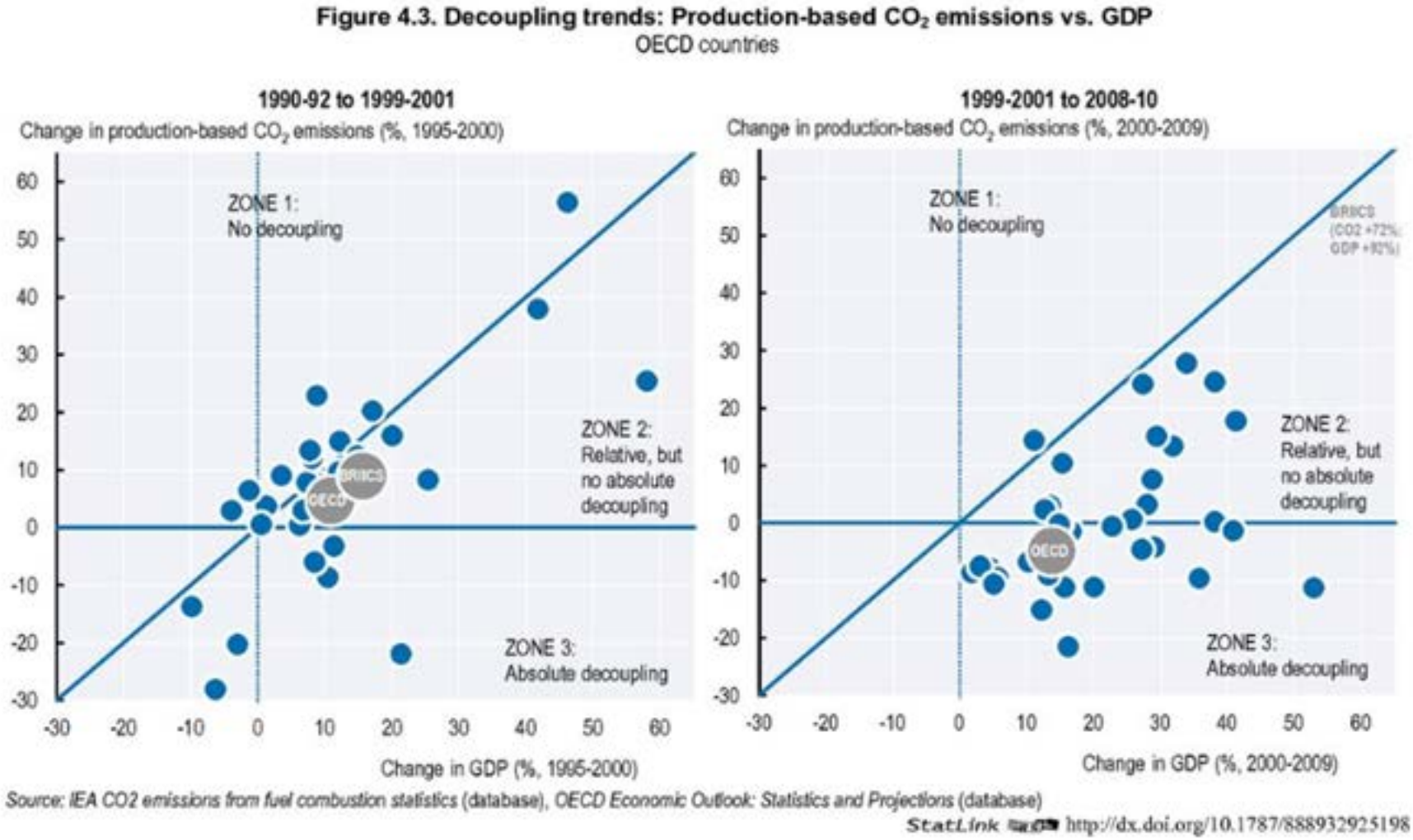
Stabilisation of electricity in mature economies

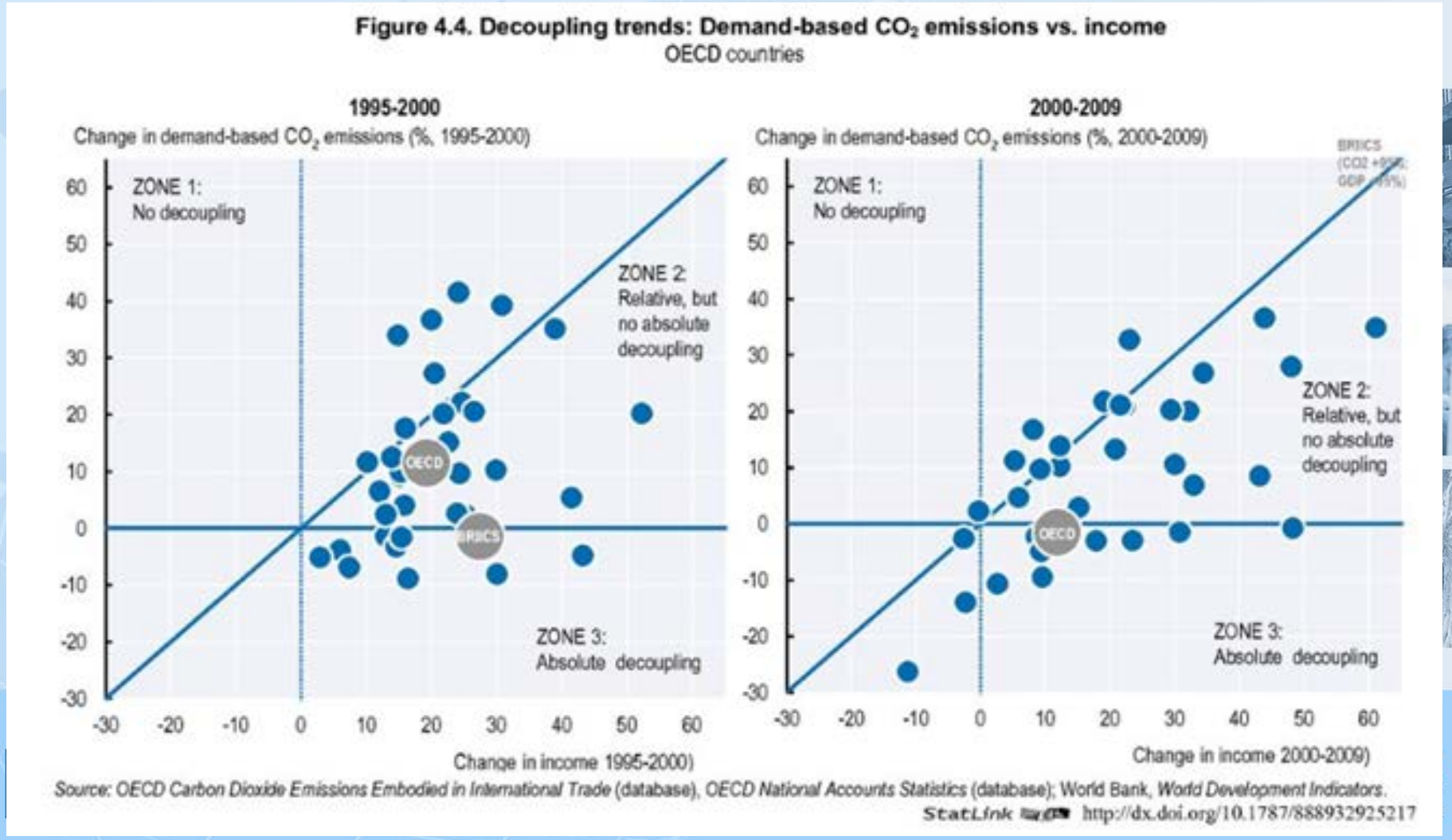




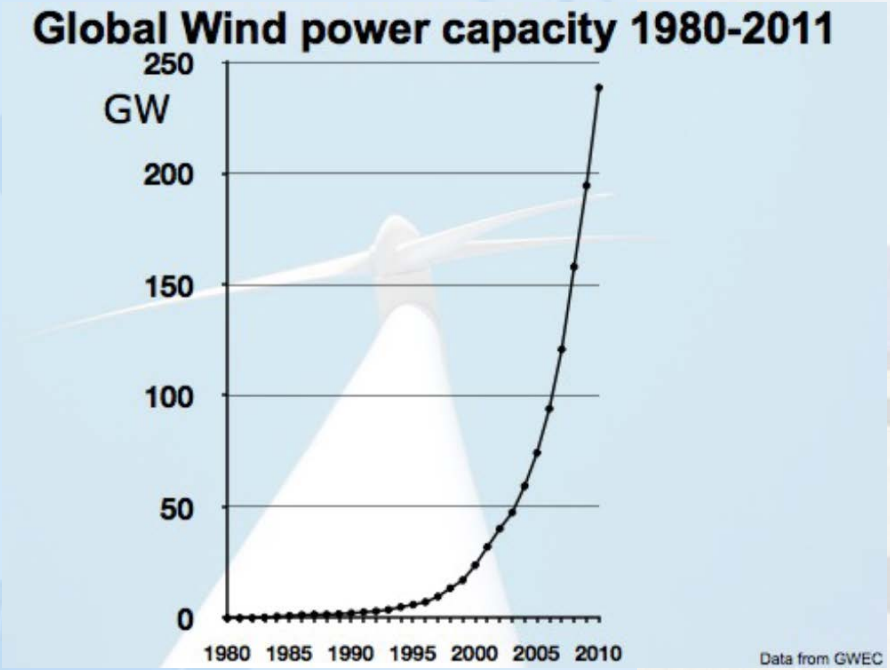
Increased Carbon and Energy Productivity Production-Based

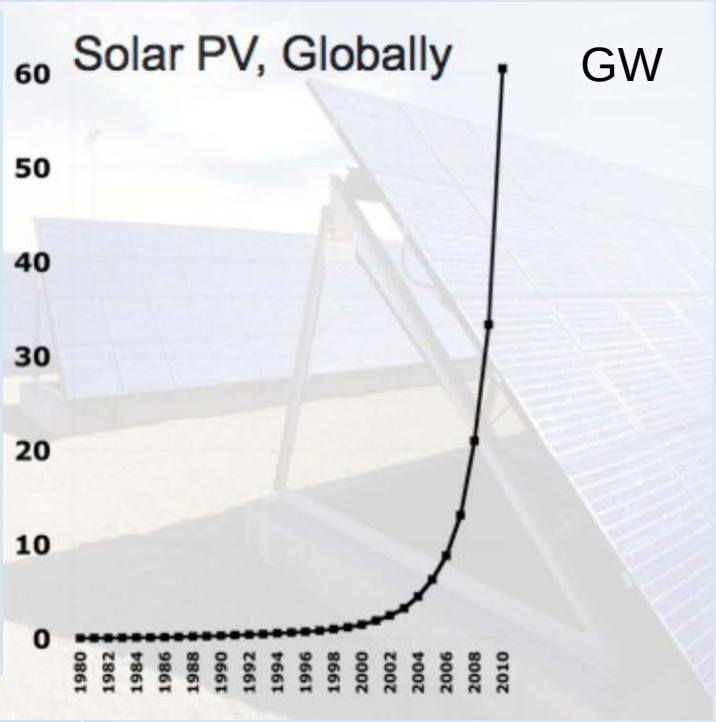


Carbon and Energy Productivity Demand-Based



Takeoff for Green Energy

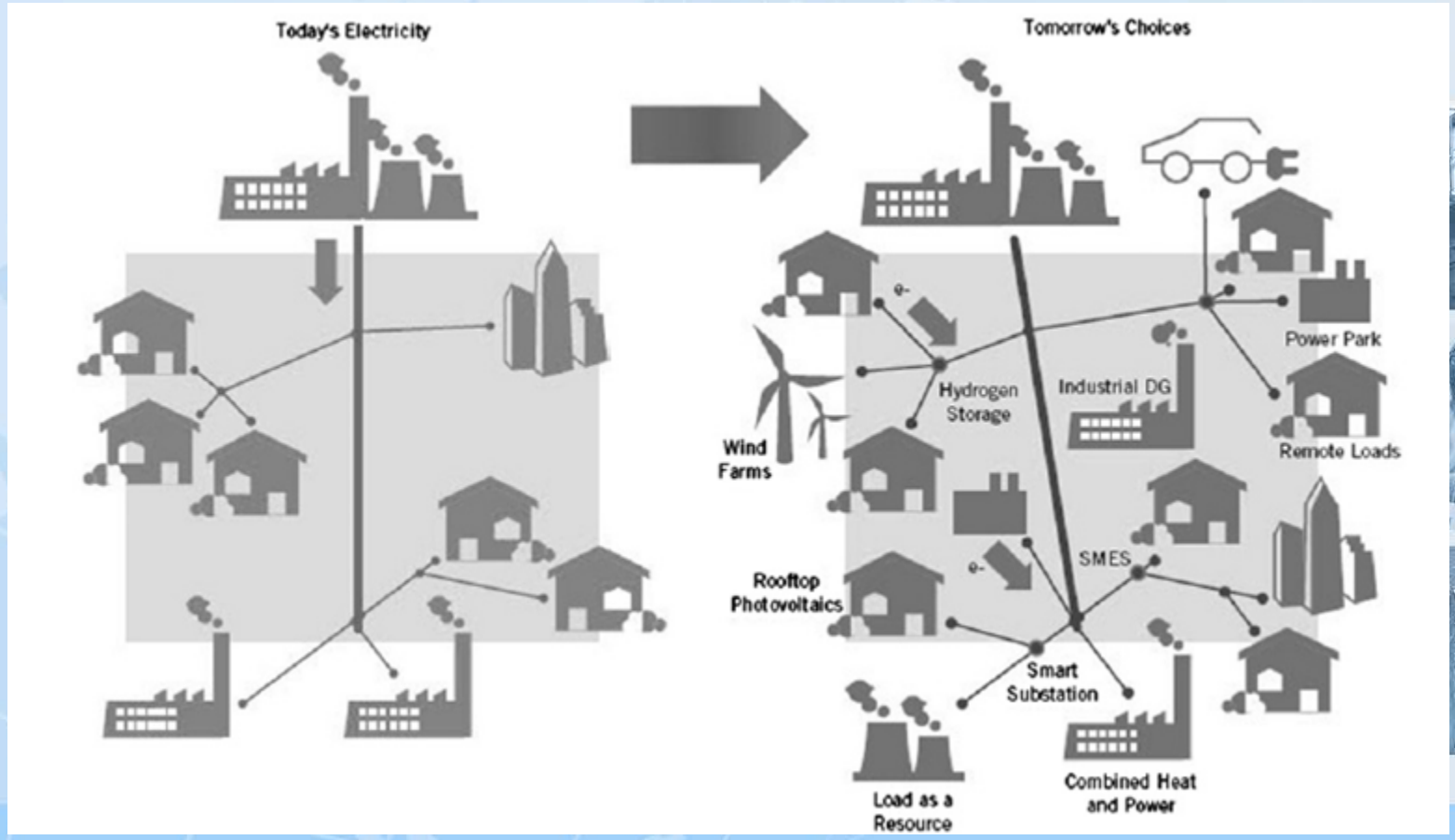




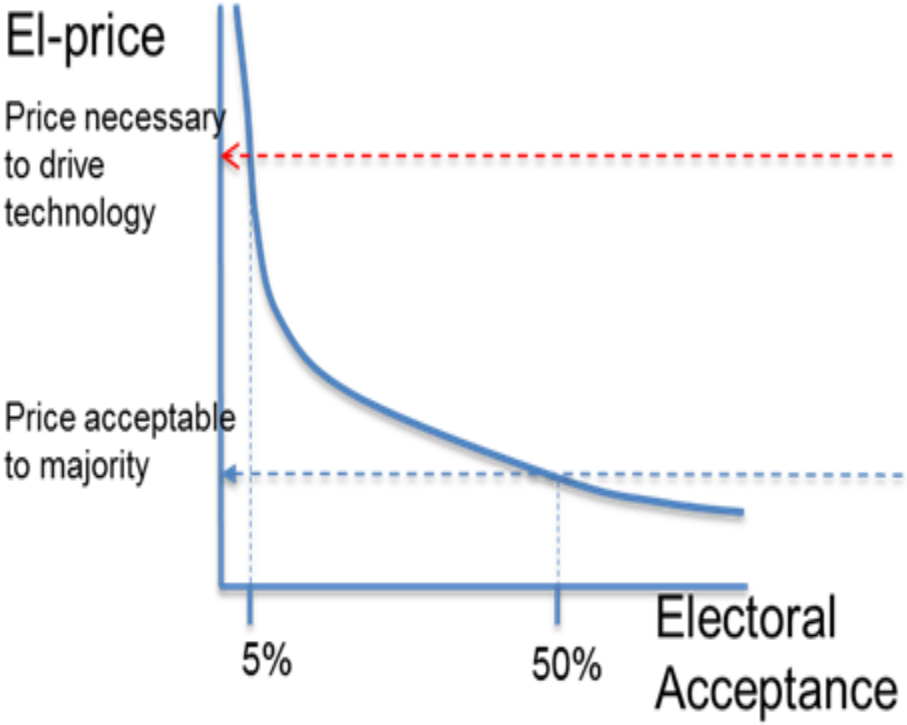
From Kåberger 2012

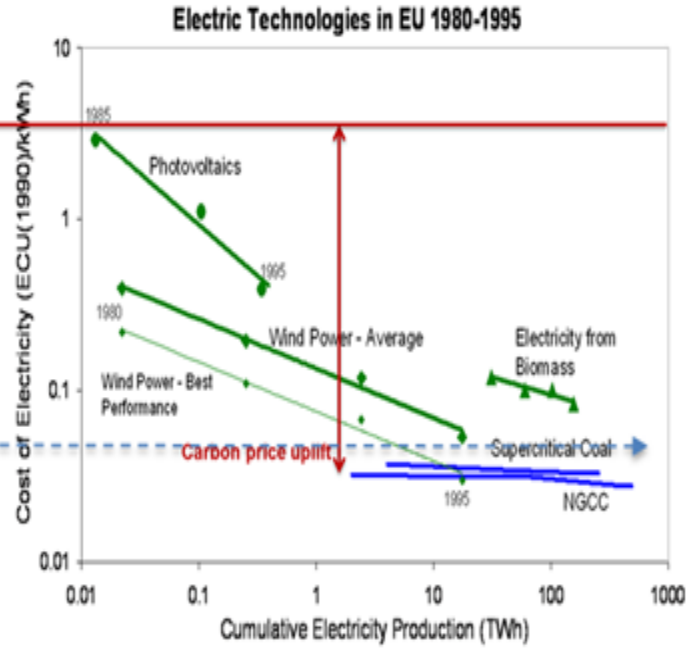
A Result of Policy and Technology Migration

Transformation of el-system



The Problem of Marginalism in Staging Transition





Sub-National Initiatives and Networks

The C40 Cities Climate Leadership Group (C40) is a network of the world's megacities committed to addressing climate change.

Acting both locally and collaboratively, C40 Cities are having a meaningful global impact in **reducing both greenhouse gas emissions and climate risks.** C40 brings together a unique set of assets and creates a shared sense of purpose. C40 offers cities an effective forum where they can collaborate, share knowledge and drive meaningful, measurable and sustainable action on climate change.

Explore an interactive list of the C40 Cities and our **Networks** and **Research** connecting them.

LATEST FROM OUR BLOG

September 01, 2014

C40 & Siemens Kick Off Voting for this Year's Citizen's Choice Award

Voting opens today for the Citizen's Choice Award, which will honor one of the 31 finalists of this year's C40 & Siemens City Climate Leadership Awards... chosen by you!

August 28, 2014

EUROPEAN GREEN CAPITAL

An initiative of the European Commission

POPULAR

Call for 2017 Applications now open!

or

Ljubljana wins 2016 European Green Capital Award

New video now available

Latest news

GreenHopping – Changing the Future of Travel

2014 – Copenhagen

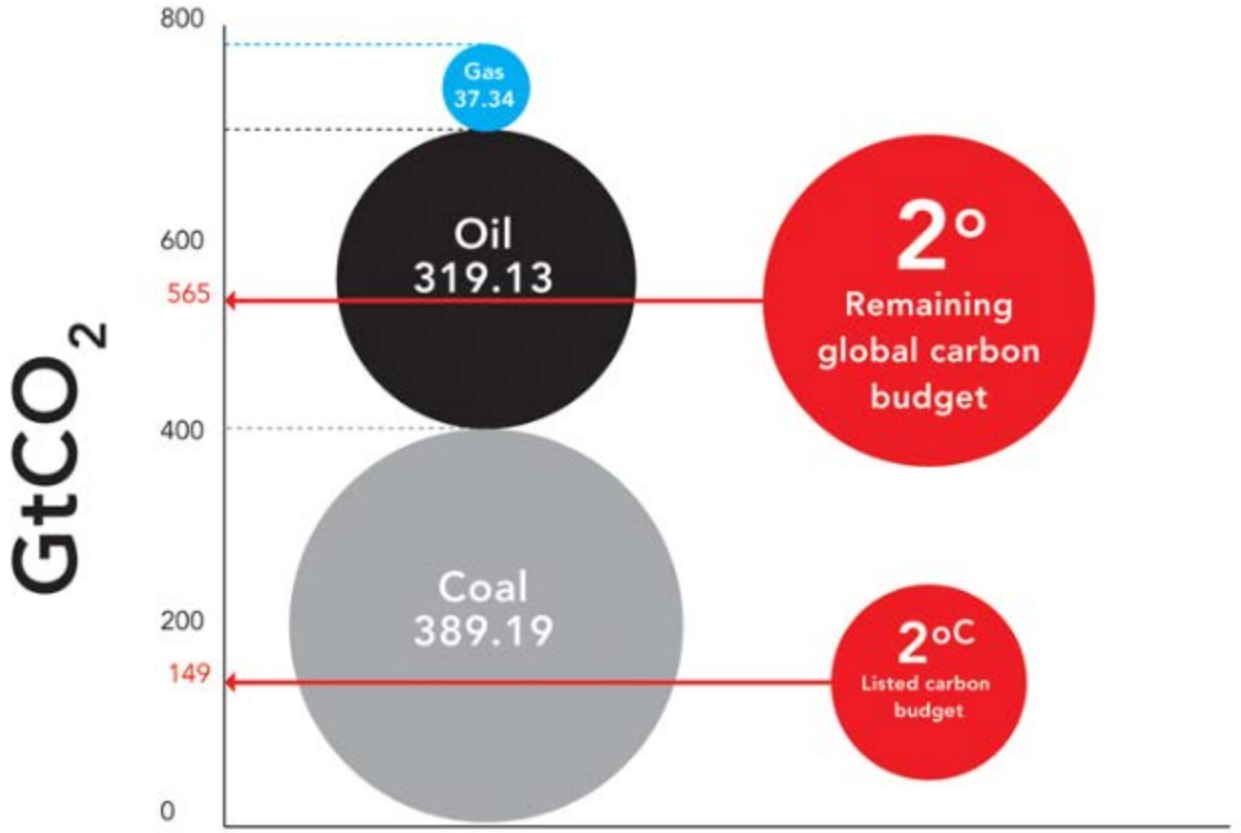
Climate neutral by 2025

Mature, Catchup and Developing Economies

Responsible Finance

Carbon dioxide emissions potential of listed fossil fuel reserves

Fig.3



Mature Economies

Advantages

- Have technology competencies and resources to stage green transition.
- Have largely stopped expanding energy consumption due to high efficiency and saturated demand.

Disadvantages

- Large investments and sunk costs in the carbon economy
- Strong vested interests in carbon.
- Green growth become a zero sum game as it has to displace carbon in non-expanding energy sectors.

Catchup Economies

Advantages

- Are gaining technology competencies and resources to stage green transition.
- Green growth is part of a positive sum game where there is room for everything due to rapid expansion.
- Have a chance to implement latest technology when they start upgrading

Disadvantages

- Are committed to strong growth
- Have high demand expectations
- Growth is prioritised before anything else

Developing Economies

Advantages

- Are at a low level of consumption, and have a long way to go
- Green growth could be part of a positive sum game where there is room for everything due to rapid expansion.
- Have a chance to implement latest technology or leapfrog when they start upgrading,

Disadvantages

- Are committed to strong growth
- Have high demand expectations
- Growth is prioritised before anything else
- Are probably hindered by developmental limitations
- Low technological competencies may limit opportunities
- Governance problems in weakly developed states

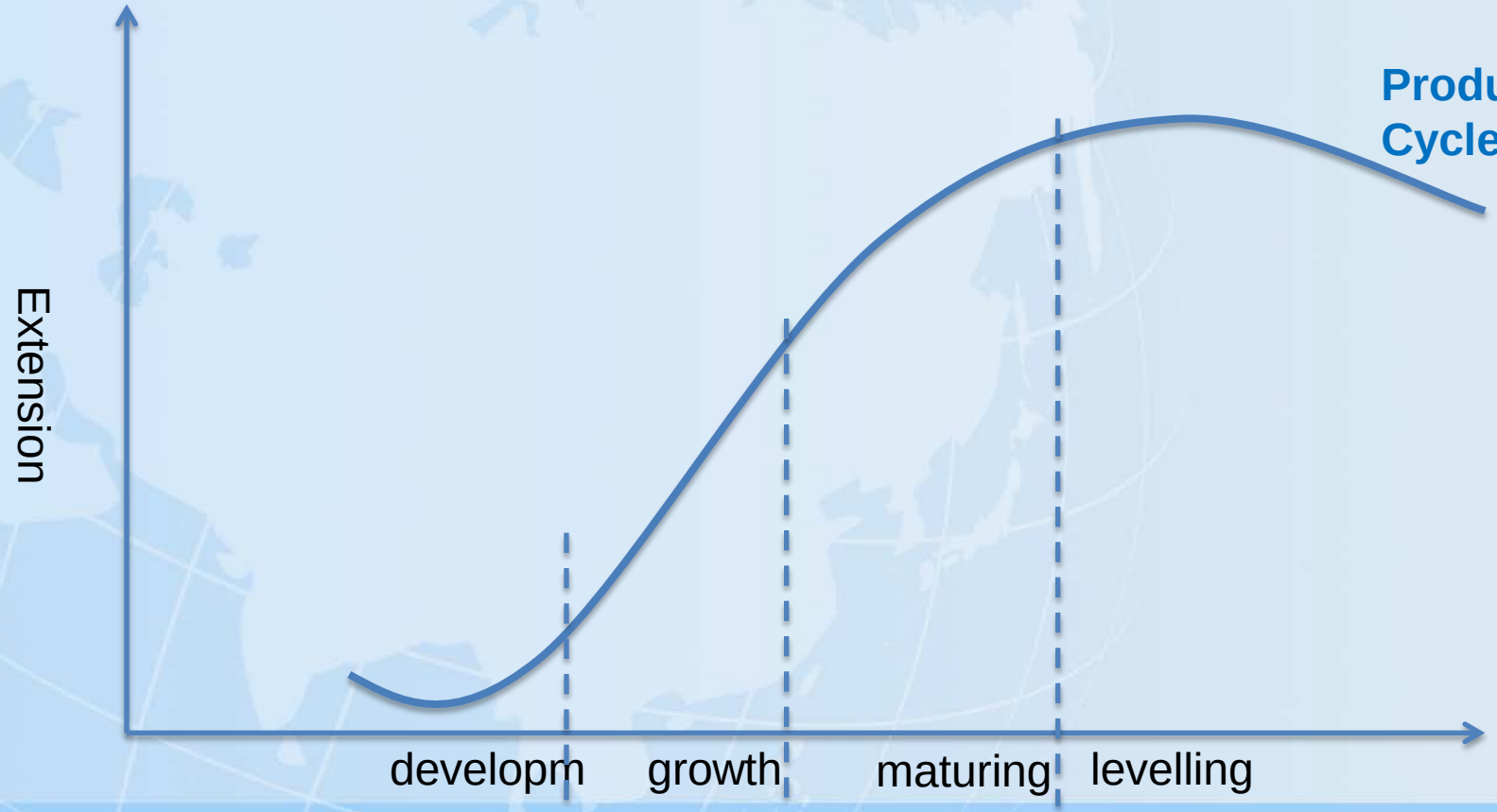


Infrastructural Hurdles in a Development context: African Automotive Sector

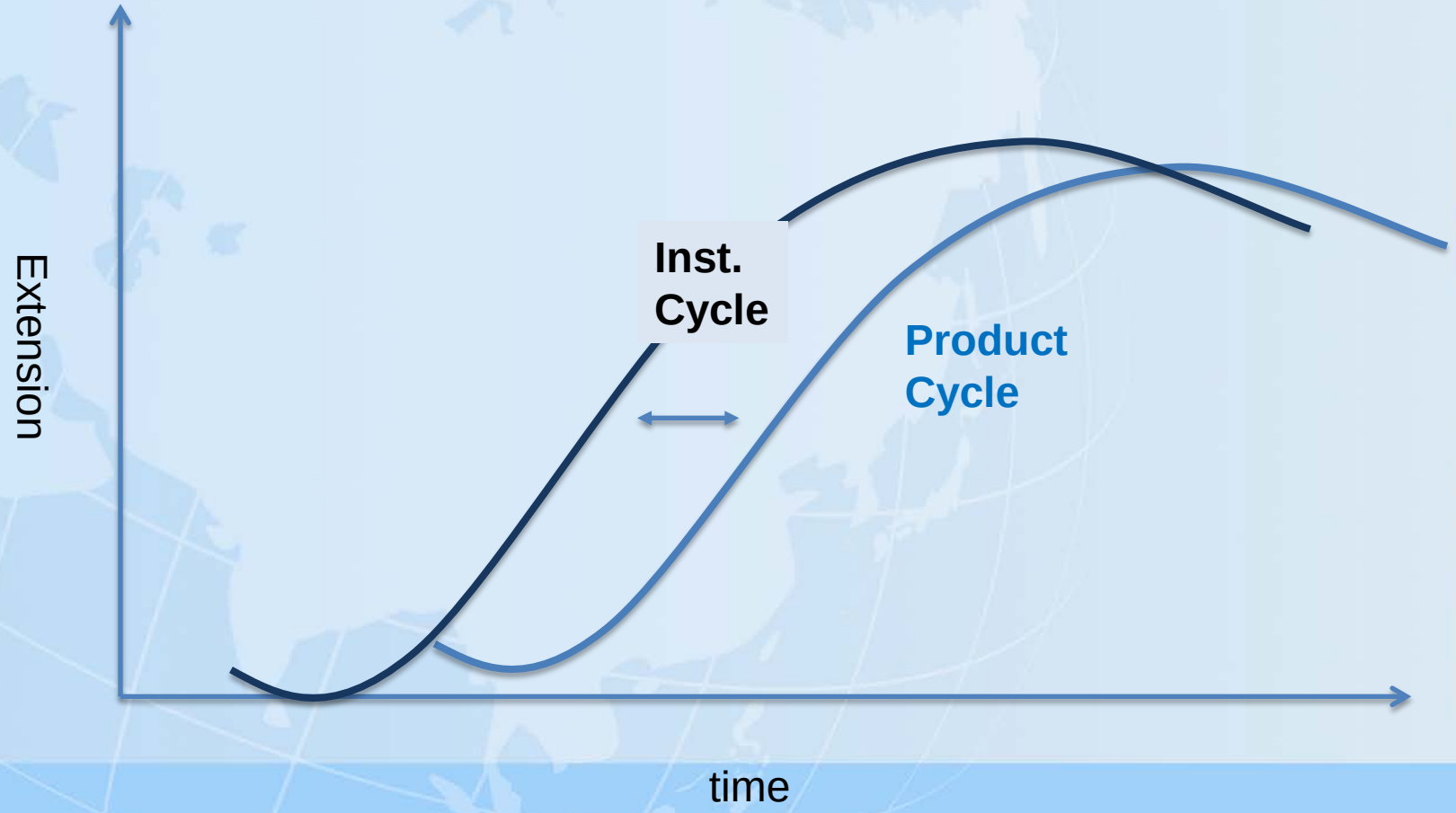
- Tough roads do not allow too advanced vehicles.
- Toyota Hillux – preferred vehicle comes in a rough version for African roads
- Oil refineries deliver qualities that do not allow most advanced engines
- Car mechanics not able to repair advanced electronics
- Change with emerging urban markets and middle class car use



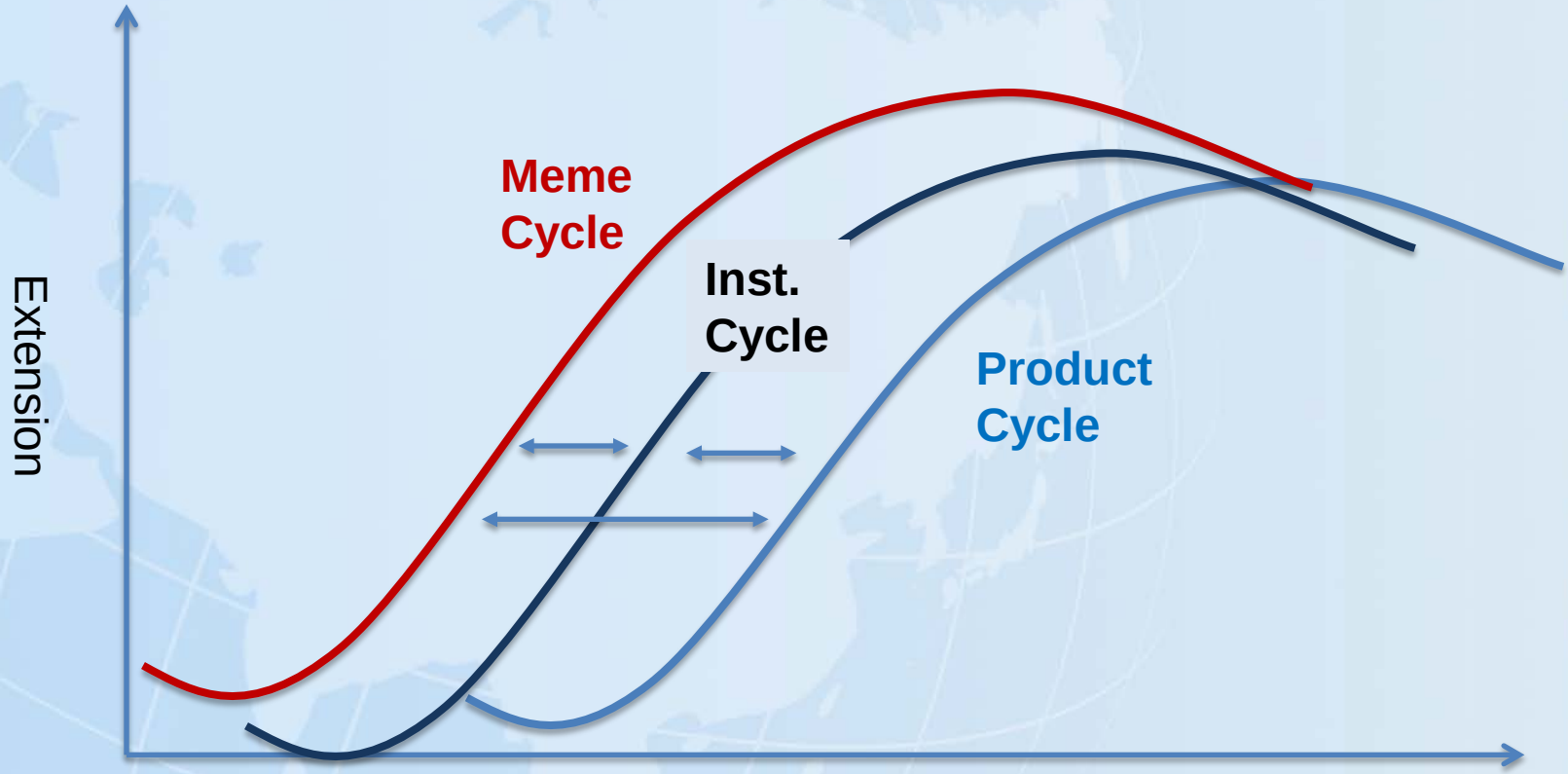
Product cycle



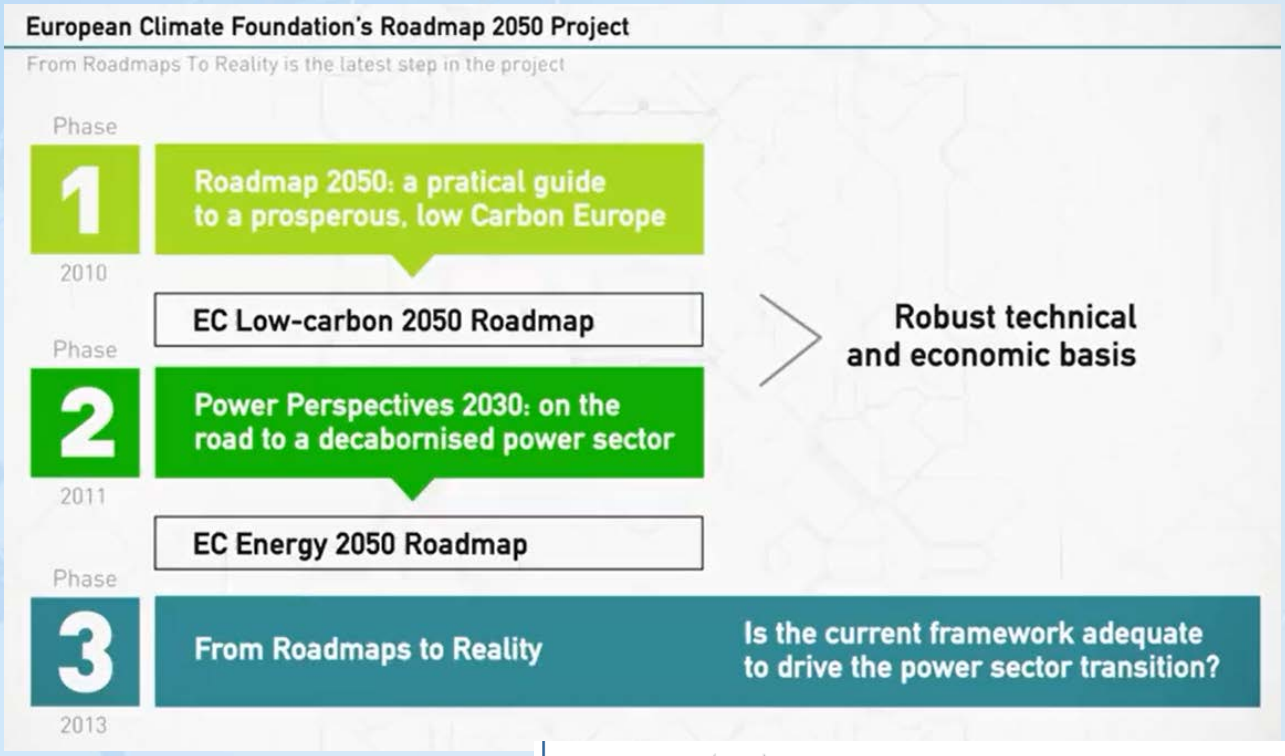
Institutional & Techno-Economic Dynamics

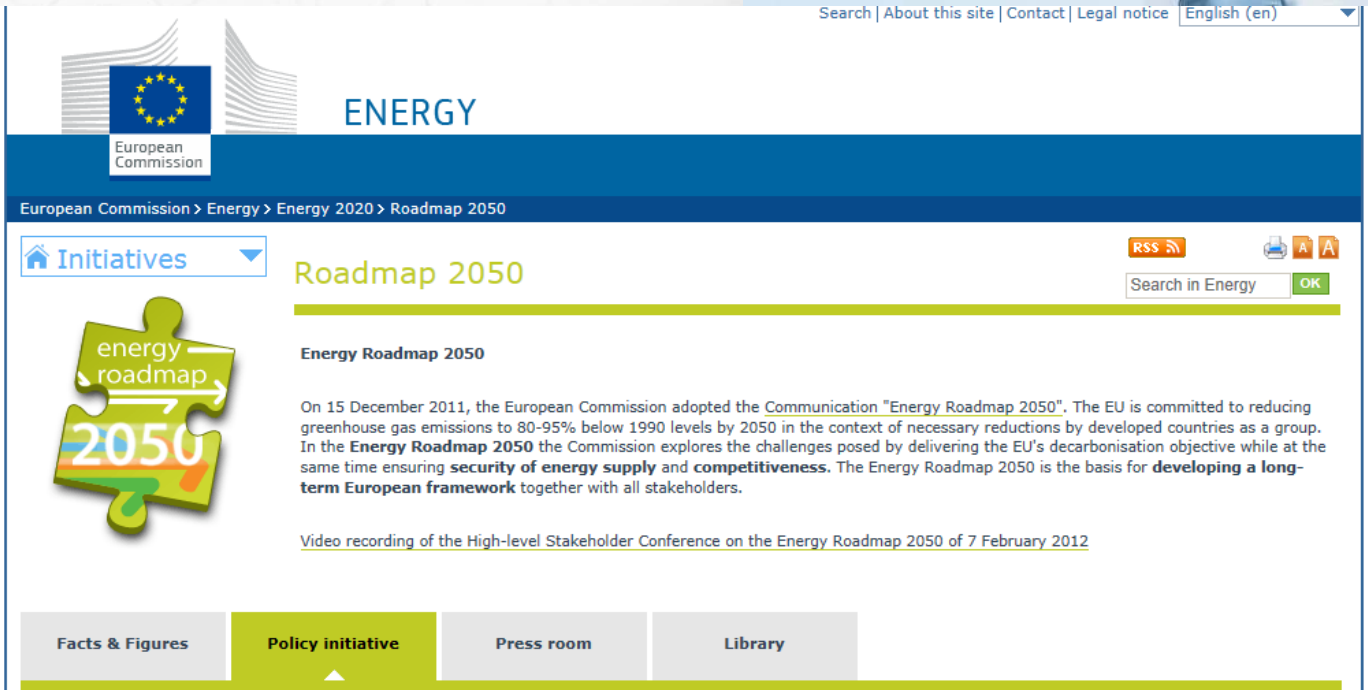


Cultural,Institutional & Techno-Economic Dynamics



Green Roadmaps





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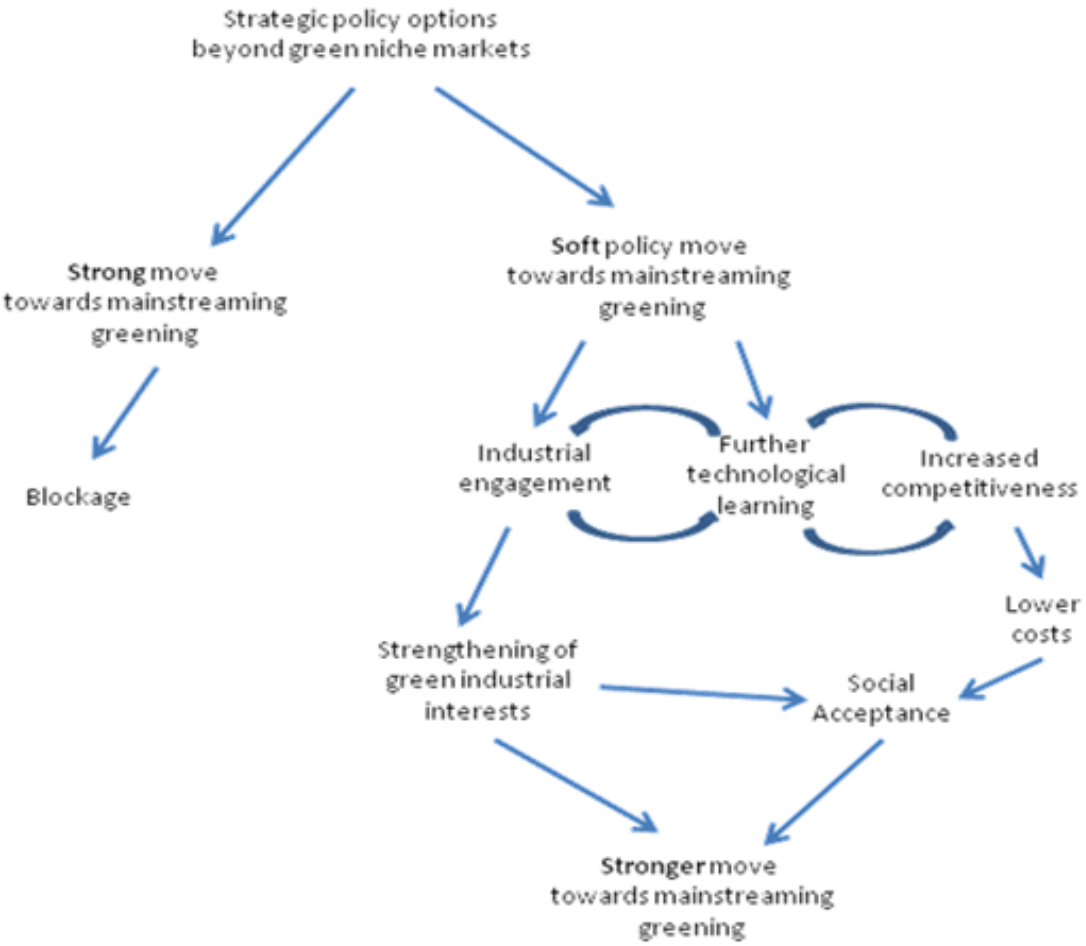
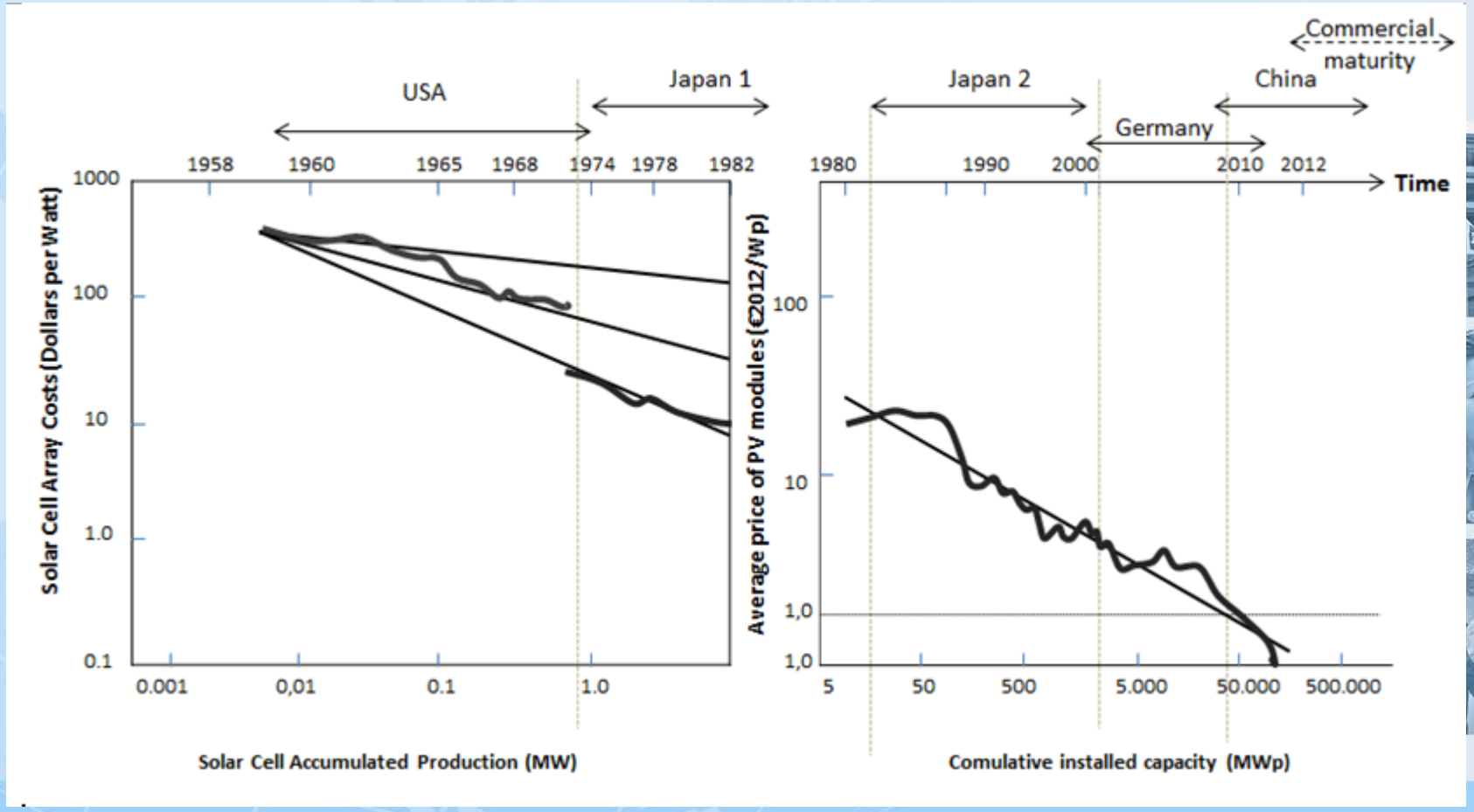
Transition by Sequential Triggering

Figure 15: The Relay Model in Open Game Form



Migration of Technologies and Lead Markets

Global Innovatorium



Technological Innovation Perspective on Kondratieff waves